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INTEGRATED SOFTWARE SYSTEMS: EXPERIENCE AND OUTLOOK

INTEGRATED SOFTWARE SYSTEMS:
EXPERIENCE AND OUTLOOK

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I

I INTRODUCTION

A. OBJECTIVE AND SCOPE

- INPUT urges users to become increasingly knowledgeable ~~of~~ about the integrated DBSM-applications software available in the marketplace. By better understanding the characteristics of integrated systems, more effective decisions can be made regarding potential application to current and future user requirements. Recognition of situations in which integrated systems can advantageously be incorporated into overall systems planning is especially valuable as the software migrates down to mini- and microcomputers.

- Software integration is of critical importance. Planning and implementation of integrated systems necessitates a knowledge of available software and suppliers, plus a suitable approach for ensuring compatibility between outside and internal systems.

- The purpose of this report is to assist information systems (IS) users in understanding the integrated DBMS-applications software environment to allow them to determine when integrated systems should be considered, and provide them guidelines for selecting and installing suitable products.

- Several issues are examined:

  - Which applications lend themselves to integration?

- To what extent must integrated products be modified for in-house applications?

- What are the advantages and disadvantages of integrated software systems?

- What is the experience of users with integrated software?

- How do user experiences differ between major industry groups?

- What are the impacts of integrated systems on communications? On standards?

- Who are the leading integrated software vendors and how do they differ?

- What are the key decision factors in selecting integrated software and suppliers?

- How can vendors assist in developing integrated systems?

- How should users incorporate integrated software into their future system development plans?

B. DEFINITIONS

o Throughout this report, there will be reference made to three types of software:

- Data base management systems (DBMS).

- Application software.

- Integrated software.

o The terms are defined as follows:

1. DATA BASE MANAGEMENT SYSTEMS (DBMS)

o Software systems intended to centralize the creation, control, and maintenance of data files, so that multiple application programs can access data without having to create duplicate file systems.

2. APPLICATION SOFTWARE

o Software designed to operate as a system for a specific user function which directly supports a business, scientific, educational, or other end-user organizational goal.

3. INTEGRATED SOFTWARE

o For the purposes of this report, integrated software refers to the combination of DBMS and application software. It does not encompass integration between multiple applications and does not include packaging with hardware (which is generally referred to as a "turnkey" or an "integrated system").

C. METHODOLOGY

o The information for this report was obtained from a number of sources.

- INPUT conducted 51 interviews with a random sample of software users. A profile of the interviewees and the user questionnaire are contained in Appendixes B and C.

- Responses were grouped and compared for four major industries: discrete manufacturing, processing manufacturing, banking, and insurance.

- Interviews were also conducted with ten users of installed integrated software to compare their responses with those of the 51 users interviewed.

- Information on commercially available software and their suppliers was ~~ascertained~~ acquired from several sources:

  - In-depth, personal interviews with nine vendors (see Vendor Questionnaire in Appendix D).

  - A review of trade publications and vendor literature.

  - Discussions with industry leaders, observers, and senior INPUT staff members.

- Previous INPUT studies were also reviewed and relevant information extracted. A listing of related INPUT reports is contained in Appendix E.

D. REPORT ORGANIZATION

- The remainder of this report is organized as follows:

  - Chapter II is an Executive Summary formatted as a presentation for group discussion.

- Chapter III assesses the integrated software directions and trends.

- Chapter IV examines integrated software from the user's perspective.

- Chapter V reviews commercially available integrated software and vendors.

- Chapter VI outlines a methodology for incorporating integrated systems in development strategies.

- Chapter VII reviews the major findings, conclusions, and recommendations.

- The Appendixes contain definitions, interviewee profiles, sample questionnaires, and related INPUT reports.

II EXECUTIVE SUMMARY

- This Executive Summary is designed in a presentation format in order to:
  - Help the busy reader quickly review key research findings.
  - Provide a ready-to-go executive presentation, complete with a script, to facilitate group communication.
- The key points of the entire report are summarized in Exhibits II-1 through II-8. On the left-hand page facing each exhibit is a script explaining its contents.

A. USER EXPENDITURES TO INCREASE 20 TIMES

FOR INTEGRATED DBMS-APPLICATION SOFTWARE PRODUCTS

- Integrated DBMS-applications software products represent a substantial and increasing portion of the information systems budget. Annual expenditures for integrated software will increase over 20 times during the period 1984 to 1989.

- INPUT believes users must critically analyze integrated products to capitalize upon their advantages. Achieving a level of high-quality integration will necessitate an effective mix of in-house development and usage of vendor software. Users reluctant to establish the appropriate role for integrated systems can expect suboptimal data processing performance and cost-effectiveness.

B. INTEGRATED APPLICATIONS CHARACTERISTICS

- Seventy percent of users reported above-average satisfaction with their integrated applications; only 5% indicated below-average satisfaction.
- Applications are about evenly divided between cross-industry and industry-specific orientations.
- Customer information files and systems were most common--especially for banks and insurance companies.
- Manufacturing-oriented applications were the second-most frequent, with marketing and sales applications ranked third.
- The relatively low ranking of financial applications (general ledger, accounts receivable, and accounts payable, etc.) is attributed to these applications being among the first installed and generally having less demanding data base requirements than manufacturing and marketing applications.

C. INTEGRATED APPLICATIONS DEVELOPMENT APPROACH

- Over 70% of all users developed their integrated applications in-house. Vendor packages were normally designed for use with traditional files and modified by users for DBMS integration.
  - Discrete manufacturers rely on vendor packages almost as frequently as ~~developing applications internally.~~ they rely on developing applications internally.
  - Banks utilize internal development to a lesser degree.
  - Application development approaches for process manufacturers and insurance companies closely parallel ~~that~~ those for all users surveyed.
- Most users would prefer to purchase applications packages from traditional applications suppliers rather than from DBMS suppliers.
- Users express a strong disinclination to change DBMS vendors in order to accommodate integrated applications software. They are only moderately more receptive to adding a new DBMS.

E. VENDOR ASPECTS MORE IMPORTANT THAN SOFTWARE CHARACTERISTICS

- Most users consider vendor considerations (support and viability) ~~are~~ of higher priority than application software characteristics in ~~most~~ integrated software purchases.

- The installed base of the DBMS vendor is particularly important because a large installed base should lead to a greater number of ancillary applications packages.

- Flexibility is another highly valued quality.

- Integration characteristics (DBMS and applications) are of moderate importance.

- Applications features (query and fourth-generation languages) are relatively unimportant.

- The cost issue is relatively unimportant compared to other factors.

- Industry group differences are noted in Chapter IV. ch IV

E. Acquisition

F. ~~SELECTION~~ CONSIDERATIONS

- The primary means of acquiring integrated software applications are internal development, custom programming contracting through a third-party joint venture development with a vendor, and outright purchase of integrated packages.

- Internal development, while offering applications tightly reflecting corporate needs, is a very expensive solution to the development problem.

- Joint ventures and third-party development ~~will be~~ substantially cheaper, but ~~at the cost of control~~ offer users considerably less control.

- Cheapest is purchase of off-the-shelf packages. The problem with this alternative is that appropriate packages are simply not available. Also, control is quite low. Vendors are developing new integrated packages in earnest, however.

III

III INTEGRATED SOFTWARE USER ENVIRONMENT

- This chapter presents INPUT's assessment of the use of DBMS applications and integrated software as well as future industry and technological trends.

- This chapter also describes the characteristics of integrated DBMS-application software reported by the sample of software users surveyed for this report. These characteristics include:

  - Level of user satisfaction.
  - Profile of installed applications.
  - DBMS-application software integration preferences.
  - Integrated software purchase decision profiles.
  - Integrated software vendor preferences.
  - Integrated systems purchase considerations.

- These six characteristics will be examined ~~considering~~ with respect to all users plus four industry sectors: discrete manufacturing, process manufacturing, banking, and insurance.

A. DBMS, APPLICATIONS AND INTEGRATED SOFTWARE USE

- Exhibit III-1 depicts the current usage mix of DBMS, application and integrated software, and their projected usage levels ~~during the next~~ after five years.

- The use of ~~both~~ DBMS and applications software is expected to increase about 30% per year.

- Accelerated growth of integrated software systems will result in:

  - The proportion of mainframe installations that are running integrated software ~~to~~ increasing from about 20% in 1984 to 70% by 1989.

  - Integrated software systems more than doubling as a percent of all software used during the same period.

B. TECHNOLOGY AND INDUSTRY TRENDS

- A number of trends are expected to widen the scope of use of integrated software systems.

  - Increasing availability of DBMSs for mini/micro/personal computers will cause additional growth in all three software categories. These DBMSs will also expand the number of hardware/software alternatives available in the purchasing of integrated systems.

  - Future data structures will, of necessity, be relational; current network/hierarchical DBMSs will need to be upgraded, replaced or supplemented.

- Data dictionaries will become indispensible for managing the use of integrated systems throughout the company.

- Fault-tolerant, fail-safe environments will permit additional use of integrated systems by end-users that are not computer experts.

- Distributed data bases, while enabling remote as well as local use, present additional management and control challenges for data processing managers.

- Integrating existing systems with word processing, manufacturing, visual/voice communications, and other technologies will result in additional management opportunities and challenges.

- The increasing availability of applications development tools will cause a shift in systems implementation responsibility. While data processing generally is charged with bringing new systems on-stream, end users will increasingly assume this responsibility in the future. Thus, the role of data processing will evolve into more of a facilitator and advisor than analyst, programmer and implementer.

- Applications software for vertical markets is expected to grow 50% faster than for cross-industry applications during the next five years; a similar trend can be expected in integrated systems usage.

- To remain competitive, integrated software vendors will develop and market multiple systems oriented to selected vertical markets.

- The evolution to interactive software will continue as future systems will be adaptable to changing users' needs and capable of operating on a variety of hardware, operating system, teleprocessing monitor, and data base environments.

- Differences noted among industry group users are:

  - Of the four industry groups surveyed, discrete manufacturing and banking are the most receptive to integrated DBMS-application software.

  - While discrete manufacturers and bankers will increase their expenditures for integrated software (to over 50% of the total by 1987), insurance companies and process manufacturers plan to increase their outlays even more during the same three-year period.

C. LEVEL OF USER SATISFACTION

- As shown in Exhibit III-2, overall user satisfaction with applications running on a DBMS, either purchased or developed internally, is quite high, averaging 3.7 on a 5-point scale.

  - Seventy percent of the respondents reported above-average satisfaction levels (i.e., ratings of "5" or "4").

  - Only 5% reported below-average satisfaction (i.e., "1" or "2").

- No significant differences in satisfaction levels were noted among the four major industry groups.

D. PROFILE OF INSTALLED APPLICATIONS

- Exhibit III-3 presents a profile of installed integrated applications.

- Packaged applications typically had been designed for use with VSAM files and extensively modified by the users to run on IMS or IDMS.

- A primary reason for the low occurrence of DBMS-based financial applications is that these applications were generally among the first installed (e.g., general ledger, accounts payable, etc.), and did not require as advanced a DBMS as the other applications.

- Among survey respondents IBM currently has over half the installed user base, followed by Cullinet, Software AG, Applied Data Research (ADR), and Cincom.

- In-house development was utilized in over 70% of the installed integrated systems.

E. DBMS/APPLICATIONS SOFTWARE INTEGRATION PREFERENCES

o As indicated by Exhibit III-4, users expressed a strong preference for adding applications into present DBMSs rather than attempting to integrate DBMS with existing applications. They are even more reluctant to purchase or develop new integrated software, preferring to build onto existing installations.

o Users generally desire application modularity, so purchases can be made sequentially.

o Many of the reasons users cited for integrating applications with DBMSs involve data management.

- Data control is more readily achieved in integrated systems.

- Data integrity is greater.

- Data are better structured for audits.

- Common languages and file structures can lower redundency.

- Extraction of reports is viewed as much easier with integrated systems.

- Integration allows management of data as a strategic resource, accessed by managers on a "need-to-know" basis.

o Several users expressed the desire to run applications on DBMSs, but cited their inability to integrate the applications internally due to limited manpower; hence, their reliance on packages.

o A few users indicated that they did not view integrated software as a positive development.

  - One complaint registered about integrated packages was that they are frequently so complex that internal integration is much easier and equally effective.

  - Some users believed it was better to purchase applications designed for flat files and integrate them into a DBMS themselves. Several cited the "transparency" features of ADR's DataCom software as being especially useful for this type of conversion.

  - Others reported their needs were so specialized that no packages currently available (or expected in the future) were able to satisfy their requirements.

o A few users reported that they do not utilize DBMS because of cost and difficulties encountered.

- Benefits proposed are unclear.

- Incremental return-on-investment is too low.

- Control achieved with DBMS is costly and adds to existing bureaucracy.

- Data redundancy is managed successfully without a DBMS.

o Several users maintained that the more sophisticated report writers are so advanced that there is no need for applications packages; i.e., applications can be written directly onto a DBMS.

o Some companies are building integrated applications using fourth-generation languages and advanced applications development tools which enable the users to avoid the purchase of additional packages.

o Note: The last two observations regarding report writers, fourth-generation languages, and applications development tools being perceived as viable alternatives to integrated systems suggests that the benefits of integrated software may not be adequate (or fully acknowledged) in some user environments.

o Also indicated in Exhibit III-4 is the reluctance of users to add to or change their DBMS. While both alternatives received below-average acceptance, the respondents indicated they prefer adding a DBMS to their current system rather than changing to a new DBMS structure. This suggests that increased computational overhead is less painful than switching to a different system and vendor.

o The concept of a single data base controlling all company data has frequently given way to user acceptance of multiple data bases, but generally of similar DBMS architecture.

- Differing criteria for software purchase by these two buyer types are also indicated in the exhibit.

F. INTEGRATED SOFTWARE ~~VENDOR PREFERENCES~~

- Users expressed a preference for purchasing integrated software systems from traditional applications vendors, as shown in Exhibit III-5.

- Prior INPUT studies have indicated that there is widespread acceptance in the marketplace of using a second supplier in-house (i.e., different from the systems hardware vendor) if that supplier is a software firm. There is widespread reluctance to use a second supplier if that supplier is selling hardware.

- Some users indicated ~~their~~ intention to purchase fewer ~~rather than more~~ applications packages in the future. Reasons cited were the difficulties in mating packages to advanced DBMSs and the sophistication of recent application development systems. These users believe time and effort can be saved by developing new applications internally.

- While "one-stop shopping" may be desirable, users generally accept the need for considering multiple vendors to obtain needed DBMS-applications software. This acceptance may be attributed either to user resistance to ~~rely~~ on a "full-service" vendor (sole-source risk) or the lack of confidence in a single supplier to provide a truly integrated software system.

G. INTEGRATED SYSTEMS PURCHASE CONSIDERATIONS

- Twelve factors were rated by the users in terms of relative importance in purchasing integrated software systems. The ratings are shown in Exhibit III-6.

  - Vendor considerations (i.e., support and visibility) generally were more important than the characteristics of the software.

  - Integration characteristics (DBMS and application) fell in the middle of all factors considered.

  - Language offerings (i.e., query and fourth-generation) were among the least important factors.

  - Cost was rated relatively low in importance; clarity of cost structure was important, however, and premium purchase and maintenance pricing requires sufficient description of attendant benefits.

- The installed base of a DBMS is a key purchase factor, and one whose importance will increase as new applications become available for the most dominant DBMSs.

H. INDUSTRY GROUP USER DIFFERENCES

- User responses were compared for four major industry groups, i.e.,

  - Discrete Manufacturing.

  - Process Manufacturing.

- Banking.

- Insurance.

o Results from the comparisons include:

- No significant differences in overall software satisfaction (see Exhibit III-2).

- Heavy use of customer information files and systems in banking and insurance companies (see Exhibit III-3).

- Greater reliance on vendor packages (versus in-house development) by discrete manufacturers and banks (see Exhibit III-3).

- Increased receptivity of process manufacturers to purchasing or developing new integrated software (versus adding packages to an existing DBMS or integrating DBMSs into existing applications); these manufacturers were also more willing to change or add DBMSs and/or vendors. Discrete manufacturers were the most resistent to changes in this area (see Exhibit III-4).

- While no comparisons were made regarding the information systems/end-user decision-making mix, the following differences in integrated software vendor preference were noted (see Exhibit III-5).

  - All industry groups generally preferred applications suppliers to other vendor alternatives.

  - Discrete manufacturers also rated DBMS vendors highly, but third party integrators the lowest.

- Process manufacturers indicated the greatest resistance to hardware suppliers.

- Banking industry users were most amenable to hardware suppliers and least receptive toward DBMS vendors.

- Insurance companies preferred DBMS suppliers to all other vendors.

- In the area of integrated systems purchase considerations (see Exhibit III-6), the following industry group differences were noted. (III-6)

  - Discrete manufacturers rated package availability and vendor viability as especially important.

  - In addition to package availability, process manufacturers stressed the importance of query languages.

  - Bankers were more concerned with applications integration and flexibility and less sensitive to language features.

  - Vendor issues (i.e., support and viability) were especially important to insurance company users, while package availability, cost, and efficiency were less critical.

IV

IV INTEGRATED SOFTWARE VENDOR ANALYSIS

- To assist the user in gaining a better understanding of integrated systems alternatives, this chapter describes the integrated DBMS-applications software marketplace and the relative positioning of vendors within that marketplace.

- The knowledge of the market and specific suppliers can then be integrated with the characteristics of the user's environment to determine which vendors and software are the best candidates for consideration.

A. NATURE OF THE MARKETPLACE

- Software suppliers traditionally have been classified into three categories; i.e., hardware, DBMS, or applications, as shown in Exhibit IV-1.

- Only a few vendors have introduced DBMS-applications software products:

  - Cullinet, Cincom, ADR, and Software AG from the DBMS sector.

  - MSA and McCormack & Dodge from the applications sector.

- Future integrated software systems will be offered by firms from all three market sectors:

- Hardware vendors--including AT&T and the Japanese--will increasingly provide value-added features and software.

- DBMS vendors will offer applications software in addition to systems software. The larger companies, such as Cullinet, have already developed a series of DBMS-based applications products.

- Relationships between established systems software and applications software vendors will be structured in ways that can combine the talents and strengths of each supplier; one example is the MSA/ADR development and marketing agreement.

o The implications for the user are that additional--and different--vendors will be making integrated software available in the future. Decisions will thus involve a greater number of alternatives and entail more careful comparisons between outside suppliers and in-house development.

B. VENDOR POSITION

o The relative positions of suppliers in each of the three vendor categories will be reviewed.

- Exhibit IV-2 summarizes the vendor positions in terms of their orientation (hardware, DBMS, or applications software) and level of integrated system offerings. IV-2

- Exhibit IV-3 contains detailed profiles of the major DBMS vendors discussed below. IV-3

1. HARDWARE VENDORS

- IBM is the primary company in this category, although NCR, Sperry, and other mainframe manufacturers also play a role.

- IBM currently has almost 75% of the hardware market and 50% of the DBMS market.

- IBM's DBMS market share, which represents almost 5% of IBM's total software sales, has been declining due to the systems marketing efforts of other suppliers.

- The current hierarchial IBM DBMSs (IMS and DL/1) are intended for day-to-day, production environments.

- IBM's relational data base, DB2, is scheduled for release in the third quarter of 1984. DB2 is targeted for a more ad hoc, flexible environment, where productivity is ~~required~~ emphasized.

- Although DB2 is reportedly not as advanced as competitive DBMS offerings, it is still an attractive, low-risk alternative because of IBM's support resources.

- Of the installed DBMS base, manufacturing is predominant (over 40% of DL/1 sites). Banking and insurance are also significant (over 10% of all IMS sites).

- IBM offers a number of strengths:

  - Over 50 years of industry experience.

  - Established service/support reputation.

  - Largest customer base.

- Corporate strategy supported throughout company.

- Understanding of the data processing environment.

o Weaknesses are generally the mirror image of strengths:

- Reputation as outstanding hardware vendor is offset by lesser image as a software developer.

- There is less understanding of the needs of the end-user, applications-oriented marketplace. Improvement may be realized by having one sales force selling the entire product line.

- In maintaining its vast customer base, IBM must be "all things to all people," thereby making it difficult for IBM to develop specific solutions and react to individual customer changes in segments of its overall base.

o IBM's overall strategy is geared to protecting the existing customer base and maintaining account control, while reducing competitive pressure from DBMS vendors.

o IBM's DBMS-application software marketing strategy consists of:

- Developing relationships with outside vendors.

- Increasing cross-industry penetration through licensing agreements, while allowing vertical markets to be developed by independent third parties.

- IBM could also pursue purchase of an existing application development company; this action would affect the application software companies to a greater degree than it would the DBMS vendors.

2. DBMS VENDORS

- Several of the largest vendors are described below:

a. Cullinet Software

- Founded in 1968, Cullinet in 1984 will have sales that approach $120 million, which will sustaining their annual growth rate of 50%.

- DBMS revenues account for about a third of total sales.

- Application software revenue growth should increase from 4% of sales in 1983 to three to four times that amount in 1984; application software is projected to account for half of all revenues by 1987.

- About 50% of application software is developed in-house; the other half is purchased and modified:

  - Manufacturing software was purchased from Rath and Strong.

  - Financial applications were obtained from McCormack & Dodge.

  - Human Resources software was obtained from Information Sciences.

- Although prior arrangements with Apple Computer have been cancelled, Cullinet recognizes the need for incorporating personal computers in its overall strategy.

- About 40% of all Cullinet installations are in the manufacturing sector, with banking and insurance each less than 10%.

- Cullinet's strengths include:
  - Extensive customer base.
  - Established position in the manufacturing sector computer hardware/software market.
  - Consistent financial performance.
  - Strong organization, emphasizing customer support.
  - Excellent application development tools.
- Cullinet's potential shortcomings include:
  - The systems design approach is quite sophisticated, resulting in a lengthy user learning curve.
  - The integrated systems approach forces users to convert non-Cullinet DBMS to IDMS.
  - Software purchase and maintenance costs are viewed as excessive compared to the competition.
  - Cullinet experienced an aborted entry into the banking industry.
- Strategies continue to reflect Cullinet's market position:
  - Cullinet desires to surpass IBM in product capability.
  - Cullinet offers management, marketing, and product support that is superior compared to other independent vendors.

- Cullinet's goal is to be the leading source of integrated software, with applications implemented through superb development tools.

b. Cincom

- Cincom's 1984 annual sales should approach $100 million, with half of all revenues generated outside the U.S.; the annual growth rate is close to 35%.
- Reported to have the largest user base among all independents, including about 3/4 of the Fortune 100 companies.
- TIS was introduced as a relational DBMS to complement existing TOTAL hierarchical software.
- Manufacturing and finance applications are to be supplemented with human resources software (payroll/personnel).
- Strengths include:
  - Large IBM and non-IBM user base.
  - DBMS compatible with select DEC and WANG mainframes as well as with IBM.
  - There is no need to switch to a proprietary data base for integrated applications, as is the case with Cullinet.
- Potential shortcomings include:
  - Applications software is not well recognized outside the customer base.
  - Cincom's support of competitive DBMS (e.g., IDMS) is potentially self-defeating; it diverts Cincom's attention from supporting its own DBMS products.

- Cincom's strategic direction is to make applications independent of the underlying data base foundation:
  - Cincom considers DBMS as a process.
  - This strategy allows for greater diversification into additional product areas.

c. ADR (Applied Data Research)

- Although the oldest of the independent software companies (founded in the 1950s), ADR did not enter the DBMS marketplace until 1978 with its acquisition of Datacom software.
- Total company revenues in 1984 are projected to be $115 million, with growth at a 30% annual rate.
- Datacom sales growth is among the fastest in the industry.
- While government contracts contribute a significant portion of total revenues, nearly all Fortune 100 companies are also customers.
- ADR is similar to Cullinet in scope and power of DBMS products.
- While the manufacturing sector leads with about 30% of the installed sites, wholesale/retail represents over 15%. Banking and insurance are both minor industries, with each representing less than 5% of the installed base.
- Strengths include:
  - DBMS technology is well recognized and accepted by users.

- ~~Availability of~~ a number of applications development tools are available.

- Datacom's "transparency" feature is superior in interfacing with IMS and VSAM files.

- With its arrangement with MSA, ADR can offer numerous features, especially in the finance and manufacturing environments.

o Potential shortcomings:

- The management team, although in place for 15 years, has struggled recently; there is a need to ~~validate~~ evaluate the recent redirection of the company.

- Increased emphasis is needed in marketing and customer support.

- IDEAL, introduced last fall and upgraded in January 1984, remains to be proven.

- The installed base of integrated products is small.

o Strategy consists of:

- Maintaining technological position.

- Strengthening applications development tools.

- Increasing alliances with application software vendors (MSA, McCormack & Dodge, Information Science, Comserve).

d. Software AG

- Company 1984 revenues are projected to be $40 million, with annual sales growth around 30%.
- ADABAS is positioned as both a data processing and an end-user-oriented DBMS.
- Software AG's applications development approach features speed, flexibility, and ease of modification.
- Applications products are structured around NATURAL, the first commercial fourth-generation language tied to a DBMS.
- Substantial software development is provided through Software AG's German affiliate, Software AG of Darmstadt.
- Government is the leading user, with one-fourth of all installations; manufacturing represents about 20%, while banking and insurance are each around 5%.
- Software AG recently announced an agreement with Heritage to develop and market integrated systems for the insurance industry.
- Leading strengths are:
  - Name recognition.
  - Solid base of users worldwide.
  - Technologically proven DBMSs.

- o Potential shortcomings include:
  - Recent management changes.
  - Irregular financial and sales performance.
  - Need for increased support of customers and applications.
  - Small installed base of integrated products.
- o Strategic directions include:
  - Offering ADABAS at substantial discounts to encourage application vendors to develop packages.
  - Maintaining its technological position.
  - Emphasizing distributed processing systems software, including a DBMS for DEC's VAX.

e. Computer Associates International

- o Company revenues exceed $80 million, with a 35% annual growth rate.
- o CA-Universe, a relational data base, runs on IBM, Data General, and DEC mainframes.
- o There are two integrated product families:
  - Financial management.
  - Distribution management.

- o Strengths are:
  - Sustained growth rate.
  - Sound financial position.
  - Extensive international distribution network.
- o Weaknesses include:
  - Limited customer base.
  - Limited DBMS marketing/sales experience.
- o Strategy emphasizes an integrated product line aimed at end users.

f. Computer Corporation of America

- o This company developed Model 204 DBMS, which is:
  - Well regarded.
  - Designed for distributed and communications environments.
  - Limited in terms of installation base.

3. APPLICATIONS VENDORS

- o Descriptions will be provided for the major applications vendors, with a listing of other suppliers.

a. MSA

- MSA is the largest independent supplier of applications software, with 1984 annual revenues approaching $200 million and a growth rate of over 35% per year.

- MSA offers (or will introduce this year) applications software compatible with one or more of the major DBMS (i.e., IMS, IDMS, ADABAS, and DATACOM). Applications include:

  - General ledger.
  - Accounts payable.
  - Fixed assets.
  - Order processing.
  - Human resources (payroll/personnel).
  - Manufacturing.

- MSA recently entered into a development and marketing arrangement with ADR in which all MSA software will be compatible with ADR's Datacom. This action should bolster the technological and features attractiveness of MSA products when sold as an integrated DBMS-application software solution.

- Strengths include:

  - A reputation as the largest application software vendor.
  - An established company and management team.

- An established presence in selected vertical markets like banking and insurance.

- A comprehensive portfolio of proven features-rich software.

- A commitment to customer support and user satisfaction.

o Potential weaknesses noted are:

- There is a possibility of Correction of erratic profitability, despite a 40% revenue increase in 1983, must be demonstrated.

- Should ADR falter (and Cullinet and IBM exceed their expected performance), MSA could be perceived by users as having affiliated with the "wrong" vendor; a similar situation could occur if the two sales forces cannot effectively integrate their marketing efforts.

o Strategy:

- MSA must maintain its applications software lead position and customer service reputation.

- MSA must review opportunities for additional DBMS vendor agreements to strengthen its market potential without endangering existing relationships.

b. McCormack & Dodge

o The Millennium applications software series is based on an advanced financial systems design architecture, and includes:

- System development tools.

- A fourth-generation language.

- A screen/forms generator.

- A query language.

o Financial packages, running on IBM and plug-compatible mainframes, include:

- General ledger.

- Accounts payable.

- Accounts receivable.

- Purchase orders.

- Fixed assets.

- Human resources.

- Capital project analysis.

o Systems expected to be released soon include:

- Order entry.

- Inventory control.

c. Walker Interactive Systems

o Walker is a privately held company with venture capital backing.

- It is pursuing a "strategic software" approach, directed at:
  - Providing a long-term solution to automating business functions.
  - Developing real-time systems that are:
    - Integrated.
    - User adaptable.
    - Transportable to a variety of computer environments.
  - Differentiating application technology and computer technology, thus allowing users to become more productive and "interactive" developers, with direct control over their own applications systems.
  - Shifting the focus of data processing from the user to the optimization of computer technology and control.

d. Hogan Systems

- Hogan Systems is the leading independent supplier of applications software to banks. Its target market consists of 350 institutions.
- Hogan's "Umbrella System" package of systems software is specifically designed to separate data from dependence on a particular piece of hardware or applications software. It supports VSAM and several DBMS, including IMS and IDMS.
- The high transportability of Hogan applications across numerous different DBMS has been gained at the cost of features; the applications do not fully exploit the features of more powerful DBMS.

- Hogan Systems' strong expertise in the banking industry and its leading-edge application development technology ~~stand to~~ enable it to ~~continue to~~ dominate the banking integrated software marketplace.

V METHODOLOGY FOR INCORPORATING INTEGRATED SYSTEMS

- In considering integrated software in future systems planning, ~~the~~ user observations ~~expressed by the users~~ and vendor characteristics ~~of the vendors~~ and ~~their~~ products must be recognized.

- This final chapter combines the user and vendor information into an approach for users to follow when incorporating integrated systems in their development plans. Three areas are addresssed:

  - Purchased software/in-house development comparison.

  - System vendor characteristics.

  - Implementation guidelines.

A. PURCHASED SOFTWARE/IN-HOUSE DEVELOPMENT COMPARISON

- In satisfying future user requirements, the relative advantages and disadvantages of purchased software and in-house development must be weighed. Exhibit V-1 indicates some of the key issues to be included in this comparison.

V-1

- Manufacturing systems, such as MRP, are usually so complex that internal development is generally impractical; purchased software modifications, however, are inevitable to tailor the system to satisfy specific company requirements.

- Integrated marketing/sales systems are not as widely available as either manufacturing or financial software; accordingly, these applications are more frequently developed internally. An exception would be for highly sophisticated forecasting applications, where the technology is readily available in a number of software systems.

- Finance and accounting applications are widely available through purchased software. Since these applications tend to be less complex than manufacturing systems, however, internal development is often preferable. The optimal approach will depend on the situation.

- Engineering and technical applications are generally at least as complex as manufacturing applications; thus, purchased software is frequently used in lieu of internal developments.

B. SYSTEM VENDOR CHARACTERISTICS

o If purchased software is considered, alternative systems and suppliers must be compared.

o Based on the integrated software industry analysis and interviews with both users and vendors, a number of characteristics surface as representative of the "perfect" integrated software vendor. These characteristics are summarized in Exhibit V-2.

- To allow comparison between vendors, a number of company, technical and marketing issues should be examined.

I. COMPANY POSITION

- What is the supplier's "track record":
  - Financial (revenues, profitability, etc)?
  - Product reputation?
  - Sales/service support?
  - Overall image?
- What is the nature of their installed customer base?
  - Size?
  - Loyalty?
  - Similar applications?
  - Similar industry?
  - User references available?
- Is the company positioned to support future operations:
  - Financially?
  - Personnel-wise? In terms of ?

2. TECHNOLOGY

- Are the applications compatible with the user environment in terms of:
  - Existing hardware?
  - Existing DBMS?
  - Existing applications?
- How much functionality is provided with:
  - Applications development tools?
  - High-level languages?
  - Query languages?
- How much distributed processing capability is provided?
- Are interfaces provided for mini/micro/personal computers?

3. MARKETING CONSIDERATIONS

- What is the level of supplier support for:
  - End users?
  - Information systems?

- o What is the supplier and product orientation?
  - Cross-industry?
  - Vertical market?
- o How are systems sold and maintained?
  - Dedicated sales/service force?
  - Joint agreements with other vendors?
- o How does ~~the~~ pricing compare with competitors?
  - Software?
  - Modifications?
  - Maintenance?
  - Training, documentation, etc.?
- o Exhibit V-3 is a form to assist users in evaluating alternative integrated software vendors and products.

- o It should be noted that there are other alternatives in developing integrated software systems, e.g., joint ventures with vendors and third-party contracts.
  - Joint ventures offer the potential for sharing development costs and reducing development cycle time. The health of the relationship and final product quality, however, are dependent on the combined positive contribution by all parties.

- Contracting with outside third parties can represent a satisfactory alternative, provided the contractors have:

  . An established track record.

  . Sufficient expertise.

  . Adequate resources.

  . Committed to completing system development.

C. IMPLEMENTATION GUIDELINES

o To ensure that the integrated software strategy reflects technological and market trends and recognizes the ever-changing needs of the end user, the following overall guidelines are suggested:

1. STANDARDIZE THE ENVIRONMENT

o Limit the number of operating systems, DBMSs, teleprocessing monitors, reporting systems, languages, and applications development tools being supported. If proposed systems are not IBM-compatible, carefully evaluate the level of future vendor support required.

2. FOCUS ATTENTION ON PRODUCTS FROM MAJOR VENDORS

o By demanding user-proven applications and supplier commitment, risks are minimized and the opportunity for end-user satisfaction is increased.

3. MATCH VENDOR/PRODUCTS WITH YOUR COMPANY

- o To the extent possible, vendors considered should have philosophies, strengths, strategies, etc., compatible with those of the user organization.

4. BUILD IN USER PARTICIPATION

- o Application users should be involved in all analyses and decisions regarding the selection, development, and installation of their systems.

App. A

APPENDIX A: DEFINITIONS

- Data base management system (DBMS). A software system intended to centralize the creation, control, and maintenance of data files, so that multiple application programs can access the data without having to create duplicate file systems.

- DBMS terminology:

  - Hierarchical structure--a file in which some records are subordinate to others in a tree structure.

  - Network--a relationship between records or other groupings in which a child record can have more than one parent record.

  - Relation--consists of the following:

    . A flat file.

    . Two-dimensional array of data elements.

    . A file in normalized form.

  - Relational Data Model--a data base made up of relations. Its data base management system has the capability of recombining the data elements to form different relations, thus giving great flexibility in the use of data.

- Sequential--where data records are arranged in a serial manner on the storage device.

- Indexed Sequential--where data records are partitioned into smaller groups. Each group location is identified by an index, and records in a particular group are sequentially arranged.

- Inverted structure--refers to the way keys (searchable data elements) are maintained. They are like indexed sequential data records except that the index is the keyed data element.

o Application software. Software designed to operate as a system for specific applications.

o Application package. A set of programs specifically designed to perform a particular application.

o Application programs. Computer programs devised for a specific task.

o Integrated software. For the purposes of this report, integrated software refers to the combination of DBMSs and application software. It does not encompass integration between multiple applications software and does not include packaging with hardware (which is normally referred to as an "integrated system").

o PCM. Abbreviation for Plug-Compatible Manufacturers. These are producers of mainframe computers compatible with IBM systems.

App. B

APPENDIX B: USER PROFILE

- INPUT specifically aimed the bulk of the interviews at users in large U.S. corporations that use (or were using) integrated DBMS-application software.

- The composition of the sample of integrated software users responding to the survey is depicted in Exhibit B-1.

Appp. C

Appx. D

App. E

APPENDIX E: RELATED INPUT REPORTS

- o End-User Micro-Mainframe Needs, July 1984.
  - Describes experiences of organizations that use micro-mainframe linkages and systems. This report also identifies systems requirements and projects future effects of the micro-mainframe phenomena.
- o Micro-Mainframe: ~~Communications Issues~~ Telecommunications, October, ~~July~~ 1984.
  - Analyzes, in detail, microcomputer communications modes, their advantages and limitations, and how these communications are likely to change in the next two to three years.
- o Large-Scale System Directions: Mid-Year Update, ~~July~~ August 1984.
  - Identifies the major changes in residual values of mainframe and peripheral systems. This report also analyzes and forecasts IBM's hardware and software directions.
- o Data Administration: Experiences and Outlook, June 1984.
  - Provides a basis for developing a data administration strategy. This report includes a theoretical basis as well as practical recommendations for incorporating data administration into the strategic fiber of a corporation.

- o Executive Workstation Acceptance: Problems and Outlook, ~~April~~ May 1984.

  - Defines executive workstations and projects their role in executive and corporate computing.

- o Integrating Systems and Corporate Planning, March 1984.

  - Describes approaches for achieving an integrated information systems and corporate business plan and achieving full benefits from information technology.

- o Large-Scale System Directions: Disk, Tape, and Printer Systems, March 1984.

  - Provides an overview of directions in the disk, tape, and printer technologies and projects residual values of selected IBM disk, tape, and printer systems.

- o Annual Information Systems Planning Report, 1984, July 1984.

  - Describes major events and projects trends in the hardware, software, and communications industries.

EXHIBIT II-1

USER EXPENDITURES TO INCREASE 20 TIMES FOR INTEGRATED DBMS-APPLICATION SOFTWARE PRODUCTS

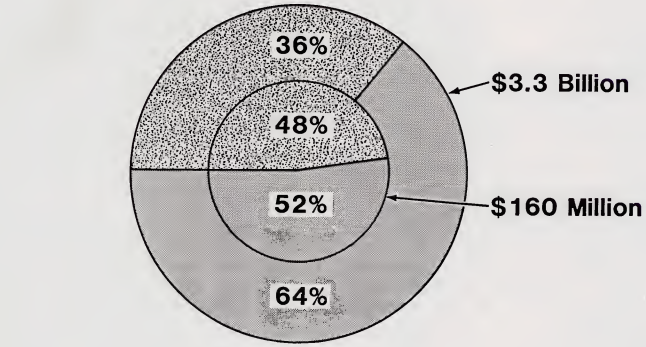

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EXHIBIT II-2

INTEGRATED APPLICATIONS CHARACTERISTICS

- 70% Indicate Above-Average Satisfaction
- 50% Cross-Industry / 50% Vertical Market
- Most Common Applications:
  - Customer Information Files/Systems
  - Manufacturing/Production
  - Marketing/Sales
  - Finance/Accounting

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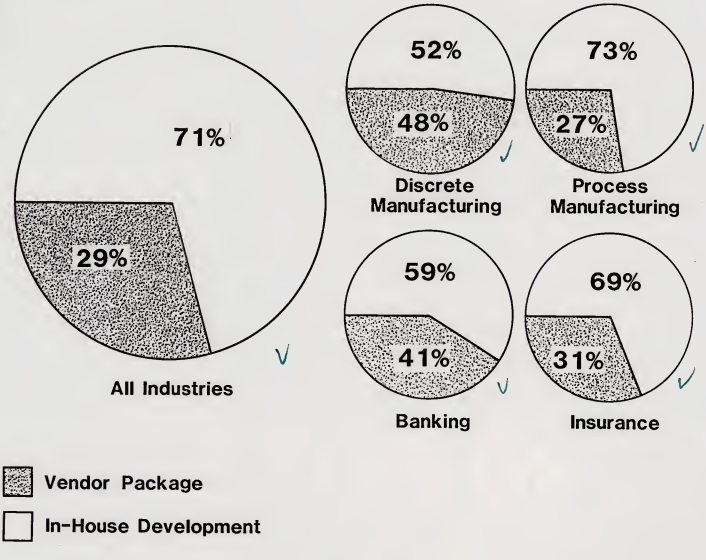
EXHIBIT II-3

INTEGRATED APPLICATIONS DEVELOPMENT APPROACH



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VENDOR ASPECTS MORE IMPORTANT THAN SOFTWARE CHARACTERISTICS

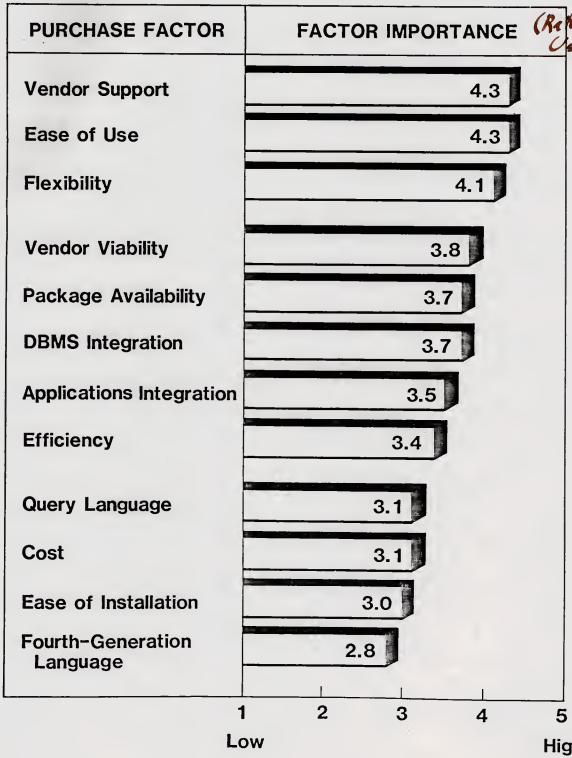

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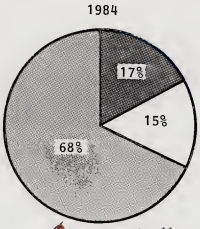
Exhibit II-5

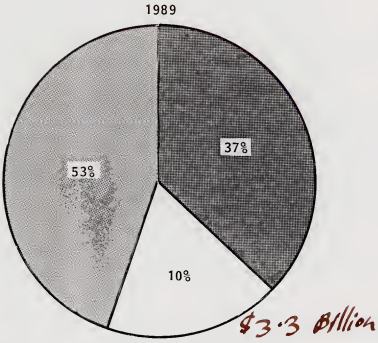
Acquisition Considerations

	Cost	Control
Internal Development	Hi	Hi
Joint Venture	Moderate	Moderate
Third-Party Development	Moderate	Moderate
Off-the-shelf Software	Lo	Lo

EXHIBIT III-1

SOFTWARE USAGE TRENDS





Percent of User Expenditures

- DBMS Software
- Application Software
- Integrated Software

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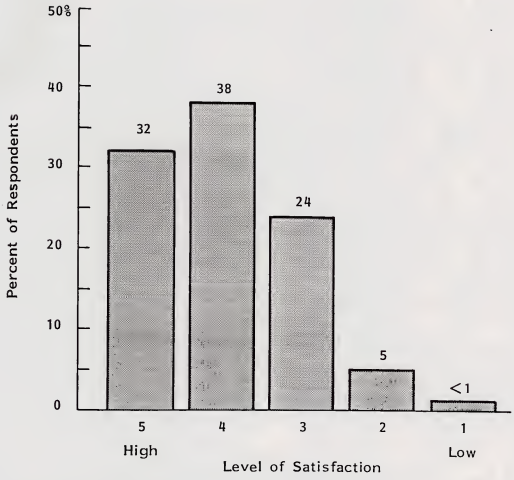
EXHIBIT III-2

OVERALL USER SATISFACTION:
DBMS-BASED APPLICATIONS
(Purchased or Internally Developed)



Average Satisfaction Level = 3.7

108

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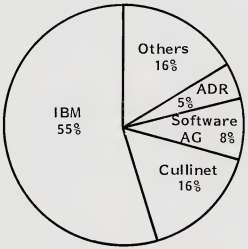
EXHIBIT III-3

PROFILE OF INSTALLED INTEGRATED APPLICATIONS

Type of Application

FREQUENCY OF OCCURENCE	APPLICATION
1	Customer Information Files/Systems
2	Manufacturing/Production
3	Marketing/Sales Management
4	Finance/Accounting

Vendor Software Share



Installation Method Share

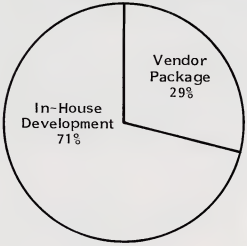


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EXHIBIT III-4

SOFTWARE INTEGRATION PREFERENCES

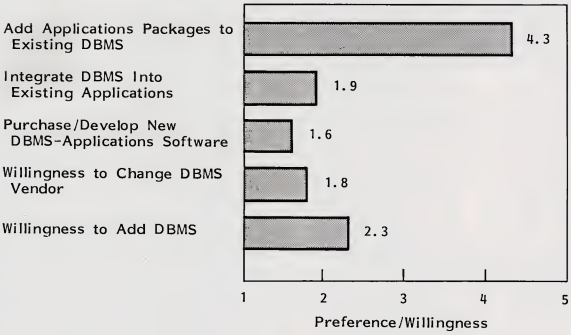

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EXHIBIT III-5

INTEGRATED SYSTEMS VENDOR PREFERENCE

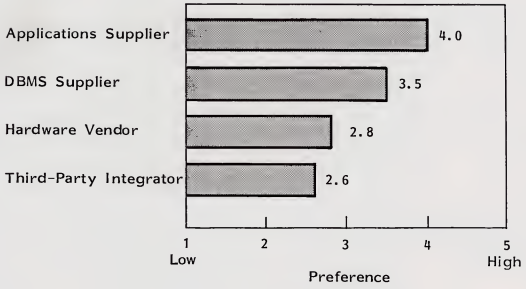

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EXHIBIT III-6

IMPORTANCE OF FACTORS IN
INTEGRATED SOFTWARE PURCHASES

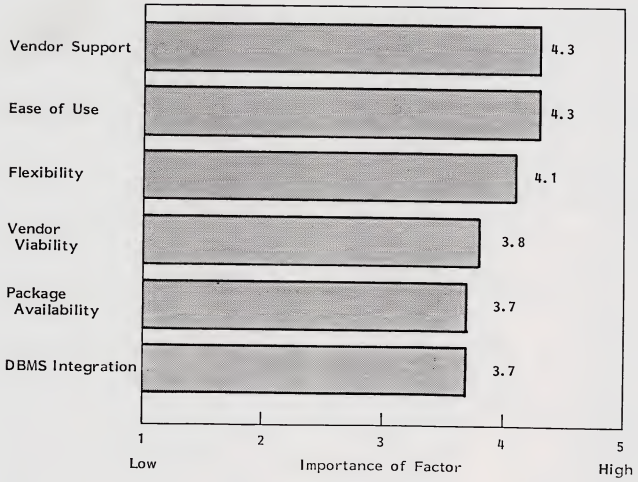

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EXHIBIT III-6 (Cont.)

IMPORTANCE OF FACTORS IN
INTEGRATED SOFTWARE PURCHASES

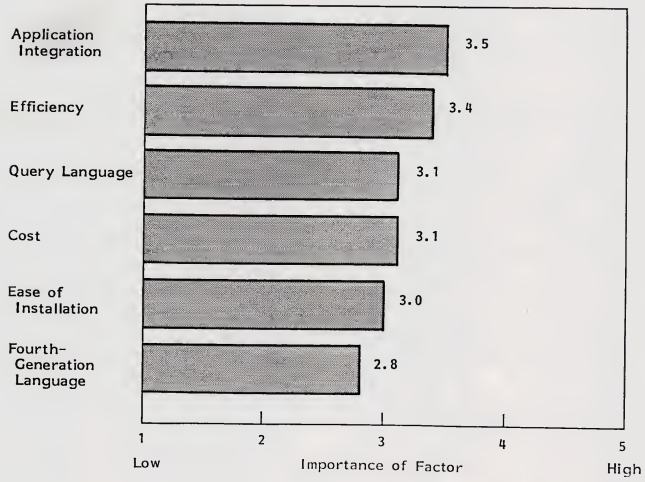

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EXHIBIT IV-1

VENDOR CLASSIFICATIONS*
(Examples)

HARDWARE	DBMS	APPLICATIONS
Mainframe	ADR	Hogan
IBM	Cullinet	MSA
NCR	Cincom	McCormack & Dodge
Sperry	Software AG	Walker
Minicomputer		
- DEC		
- HP		
- DG		

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EXHIBIT IV-2

DEGREE OF INTEGRATED DBMS - APPLICATION SOFTWARE IMPLEMENTATION

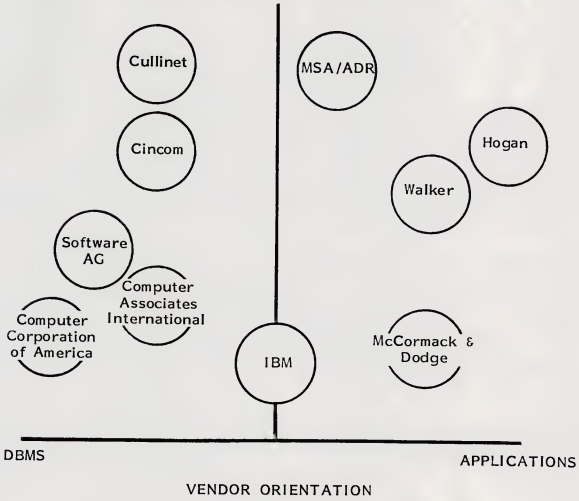

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EXHIBIT IV-3

LEADING DBMS VENDOR PROFILES

COMPANY CHARACTERISTICS	CULLINET	CINCOM	ADR	SOFTWARE AG	IBM
1984 Projected Revenues ($ Millions)	$120	$100	$115	$40	$31,520
1983-1984 Annual Growth Rate (Percent)	50	35	30	30	16
DBMS CHARACTERISTS					
Name	IDMS, IDMS/R	TOTAL, TIS	DATACOM	ADABAS	IMS, DL/1 DB2
Type*	H,R	H,R	R	R	N,H,R
Fourth-Generation Language	ADS/O	MANTIS	IDEAL	NATURAL	SQL
Percent of Company Revenues	80%	50%	20%	-	1%
Customer Sites (U.S.)	1,800	2,000	500	1,300	5,000

* N = Network
H = Hierarchical
R = Relational

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EXHIBIT V-1

PURCHASED INTEGRATED SYSTEMS/
IN-HOUSE DEVELOPMENT COMPARISON

APPLICATION AREA	PREFERRED APPROACH	
	IN-HOUSE DEVELOPMENT	PURCHASED SOFTWARE
Manufacturing/Production		X——X
Marketing/Sales	X——X	
Finance/Accounting	X——————X	
Engineering/Technical		X——X

ISSUE	ADVANTAGE	
	IN-HOUSE DEVELOPMENT	PURCHASED SOFTWARE
Development Time		X
Degree of Control	X	
Staff Resource Involvement		X
End-User Involvement	Depends on Application	
Interfaces with Existing:		
- Hardware	X	
- Operating System	X	
- Applications	Depends on Application	
Technical Risk	Depends on Application	
Financial Risk	Depends on Application	

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EXHIBIT V-2

"PERFECT" INTEGRATED SOFTWARE VENDOR CHARACTERISTICS

1. Established Reputation (Company/Products/Services)
2. Established Customer Base
3. Sufficient Management/Technical Resources
4. Relational DBMS
5. Application Development Tools
6. Higher Level (Fourth-Generation) Language
7. Mini/Micro Computer Linkage
8. Interface with Other Vendors' DBMSs/Applications
9. Cross-Industry Applications
10. Vertical Market Applications
11. End-User Orientation

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EXHIBIT VI-3

INTEGRATED SOFTWARE VENDOR/PRODUCT EVALUATION FORM

CHARACTERISTIC	RATING*	PRIORITY*	WEIGHTED RATING**	COMMENT
Company Track Record				
Installed Customer Base				
Future Support Potential				
Compatibility:				
- Hardware				
- DBMS				
- Applications				
Distributed Processing Capability				
Mini/Micro/PC Interfaces				
Support Orientation:				
- End Users				
- Data Processing				
Supplier/Product Orientation				
Sales and Maintenance Approach				
Pricing Policy				
Total				

* Scale: 1 = Low
2 = Medium
3 = High

** Weighted Rating = (Rating) X (Priority)

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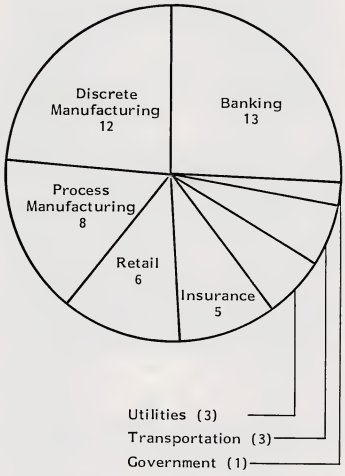
EXHIBIT B-1

DISTRIBUTION OF RESPONDENTS BY INDUSTRY



Total Respondents = 51

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CATALOG NO. USTIN

APPENDIX C
USER QUESTIONNAIRE
INTEGRATED DBMS - APPLICATIONS SOFTWARE

INPUT is a ~~market research~~ consulting firm specializing in the information ~~services~~ systems industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our ~~market research~~ information systems program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a ~~summary of~~ special summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors ~~+~~ are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data. This allows sharing of data between different applications programs without transferring data between application-dependent files.

1. Can you tell me what your reaction is to this development in a general way? Perhaps you have some positive or negative impressions about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations.

   _____

   _____

   What are the top three reasons why you would like to buy applications packages integrated with DBMSs?

   _____

   _____

2. Are you running any integrated DBMS-applications software already? (If Yes, continue. If No, proceed to Question 3 .)

   a. What are the applications? _____

   b. Did you develop them internally or purchase them? (If purchased, ~~find~~ name of package and vendor.) How much did it cost?

      _____

      _____

2. (Cont.)

c. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications ~~which~~ that use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

Was the application designed to run on a DBMS or modified by users to run on a DBMS?

_____

_____

d. What alternative vendors or methods of acquiring the software did you investigate, and why did you choose the source you used?

_____

_____

e. Why did you integrate these applications and not others? What made them lend themselves to integration?

_____

_____

_____

f. How would you rate your satisfaction with this software overall (1-5)? Why? What problems have you had with it?

_____

_____

_____

_____

3. What are your three most important applications? (By resource use or criticality to the company or purchase price.)

_____

_____

Are there any other integrated DBMS-applications software systems you are planning to acquire? What? When? Why?

_____

_____

_____

4. In choosing an integrated DBMS-applications system, how would you rate the following factors? (1-5)

a. ☐ Packages available
b. ☐ Cost considerations
c. ☐ Vendor support
d. ☐ Vendor viability
e. ☐ Integration with other applications
f. ☐ Integration with existing DBMS
g. ☐ Flexibility
h. ☐ Ease of use
i. ☐ Efficiency
j. ☐ Ease of installation
k. ☐ Query language
l. ☐ Fourth generation language
m. ☐ High-order language interface
n. ☐ Other (please specify) _____

5. What is the likelihood you would change DBMS vendors if one offered a good integrated DBMS-applications software system, rated from one to five?

_____

6. What is the likelihood you would buy an integrated system requiring you to maintain a DBMS in addition to your existing one, rated from one to five?

_____

7. What is the process your company goes through in acquiring applications software packages? I.E.,

What process is used to identify software needs? _____

_____

Who does it? _____

_____

Who makes the recommendation to acquire particular software packages?

_____

_____

Who makes the final decision? _____

_____

How long does the process take? _____

_____

How would the process be different in acquiring applications packages integrated with ~~an IDMS~~ a DBMS?

_____

_____

8. Which system would you be most likely to acquire, rated from 1-5.

a. ☐ An integrable applications package to attach to your existing DBMS.

b. ☐ A DBMS that can be tied into your existing applications packages.

c. ☐ An integrated DBMS-applications software system unrelated to your current systems

9. Please rate from 1-5 the vendors you would most likely buy integrated applications-DBMS packages from: Why?

   a. _____ A hardware supplier

   b. _____ An applications supplier

   c. _____ A DBMS supplier

   d. _____ A third-party integrator

   _____

   _____

   _____

10. What percent of your 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

    1984 _____%

    1987 _____%

    What percent would be of applications designed to use DBMSs if appropriate packages were available?

    1984 _____%

    1987 _____%

11. What percent of your 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

    1984 _____%

    1987 _____%

CATALOG NO. USTN[ ][ ]

12. Do you know of any other departments or organizations now using integrated DBMS-applications software systems or planning to acquire them?

Company _____ Company _____

Person _____ Person _____

Title _____ Title _____

Phone # (____)_____ Phone # (____)_____

Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

_____

_____

_____

_____

Confirm company, name, address for report summary forwarding.

Thank you for your time.

APPENDIX D
VENDOR QUESTIONNAIRE
INTEGRATED DBMS - APPLICATIONS SOFTWARE

INPUT is a ~~market research~~ consulting firm specializing in the information ~~services~~ systems industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our ~~vendor market research~~ information systems planning program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors - particularly Cullinet - are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data.

1. Can you tell me what your reaction is to this development in a general way? What is your experience (or impressions) about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations?

   _____

   _____

   _____

2. What are the top three reasons why your customers would like to buy applications packages integrated with DBMS?

   _____

   _____

   What are the technical considerations ~~which~~ that are encouraging - and holding back - DBMS/application integration?

   _____

   _____

3. Which applications areas do you believe offer the most opportunities in this area? Why?

_____

_____

4. Do you offer any integrated applications-DBMS packages already - or do you have plans to offer any? What are they?

_____

_____

a. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications ~~which~~ use it.

2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.

3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.

4. The application uses partly a DBMS and partly a traditional file system.

5. In choosing an integrated DBMS-applications systems, how would you think your customers rate the following factors? (1-5)

   a. Packages available
   b. Cost considerations
   c. Vendor support
   d. Vendor viability
   e. Integration with other applications
   f. Integration with existing DBMS
   g. Flexibility
   h. Ease of use
   i. Efficiency
   j. Ease of installation
   k. Query language
   l. Fourth-generation language
   m. High-order language interface
   n. Other (please specify)

6. How likely are customers to change DBMS vendors because of a particularly good integrated DBMS-applications software system, rated (1-5)?

   _____

   _____

7. How likely are customers to buy an integrated system requiring them to maintain a DBMS in addition to their existing one, rated from (1-5)?

   _____

   _____

8. What percent of DBMS sales do you expect will be tied to sales of integrated DBMS-applications systems in the next three years? Why?

   _____

   _____

   _____

9. What percent of sales do you expect from the following product approaches in the next three years?

_____% DBMS and existing (modified) packages

_____% DBMS and newly-constructed packages

10. Which system do you think users are most likely to acquire, rated (1-5)?

a. An integrable applications package to attach to their existing DBMS.

b. A DBMS that can be tied into their existing applications packages.

c. An integrated DBMS-applications software system unrelated to their current systems

11. What percent of the market do you expect the following types of vendors will have (for applications designed to run on DBMSs) in 1987?

a. A hardware supplier? _____%

b. An applications supplier? _____%

c. A DBMS supplier? _____%

d. A third-party integrator _____%

12. What percent of 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

a. 1984 _____%

b. 1987 _____%

13. What percent of 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

a. 1984 _____%

b. 1987 _____%

14. What, if any, premium do you expect customers to pay for integrated applications compared to software applications?

15. What other vendors do you see becoming active in offering integrated DBMS/applications packages?

16. Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

Confirm company, name, address for report summary forwarding.

Thank you for your time.

EXHIBIT II-1

THE INTEGRATED SYSTEMS ENVIRONMENT

- INPUT ISP Report
- Three Types of Software
  - Data Base Management Systems (DBMS)
  - Applications
  - Integrated
- Integrated Software a Major Opportunity
  - Explosive User Expenditures Expected
  - Effective Integration Strategy Needed
  - High-Quality Integration Necessary
  - Significant User Commitment Required

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Jack — this title is a bit long. Don't you think so? Jo. Anne

SER EXPENDITURES TO INCREASE 20 TIMES FOR INTEGRATED DBMS-APPLICATION SOFTWARE PRODUCTS

EXHIBIT ~~II-2~~ 11-1

~~EXPENDITURES EXPANDING SIGNIFICANTLY~~

MARKET PROJECTIONS: 1984-1989
IBM AND PCM MAINFRAME SOFTWARE

(IBM mainframe software)

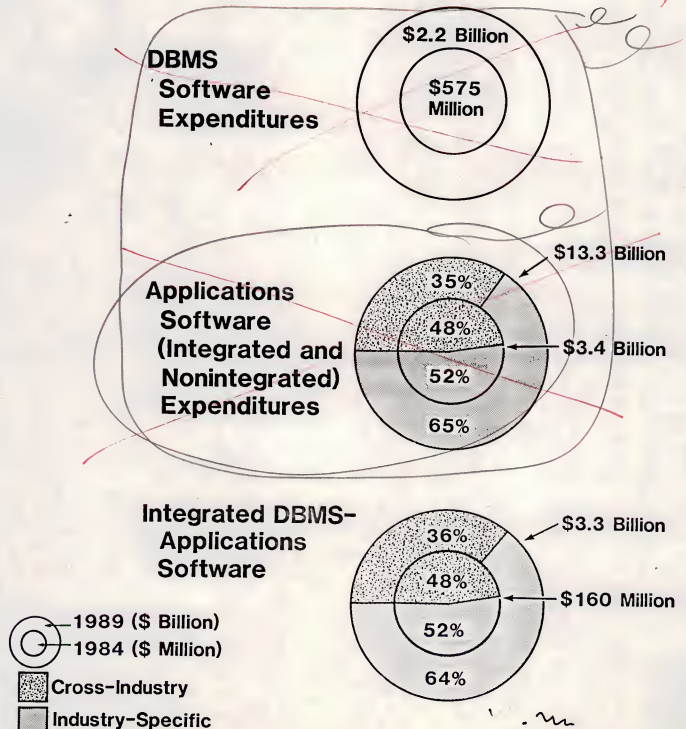

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EXHIBIT II-3

INTEGRATED APPLICATIONS CHARACTERISTICS

- 90% Report Installed Integrated Applications
- 70% Indicate Above-Average Satisfaction
- 50% Cross-Industry/50% Vertical Market
- Most Common Applications:
  - Customer Information Files/Systems
  - Manufacturing/Production
  - Marketing/Sales
  - Finance/Accounting

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EXHIBIT II-4 3

INTEGRATED APPLICATIONS DEVELOPMENT APPROACH

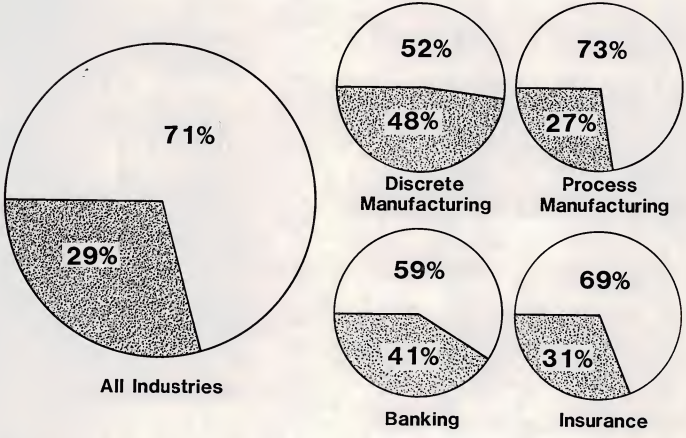

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EXHIBIT II-6

INTEGRATED APPLICATIONS VENDOR PREFERENCE

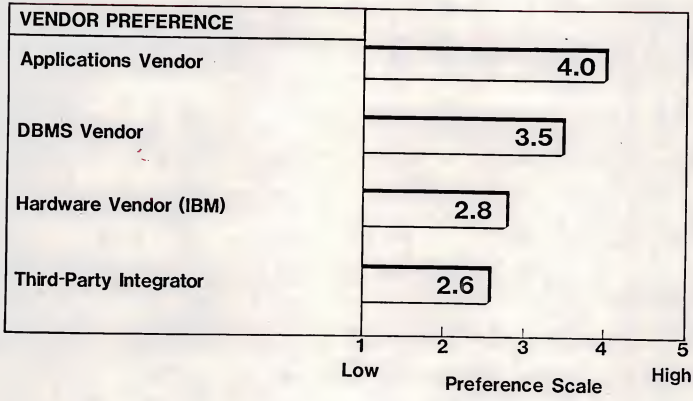

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EXHIBIT II-5

DBMS-APPLICATIONS SOFTWARE INTEGRATION PREFERENCES

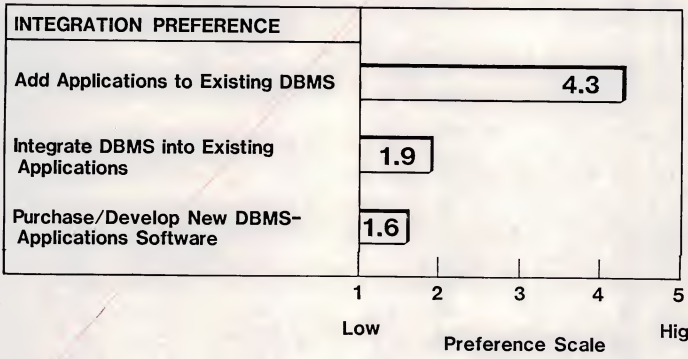

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EXHIBIT II-5

INTEGRATED SOFTWARE PURCHASE PRIORITIES

VENDOR ASPECTS MORE IMPORTANT THAN SOFTWARE CHARACTERISTICS

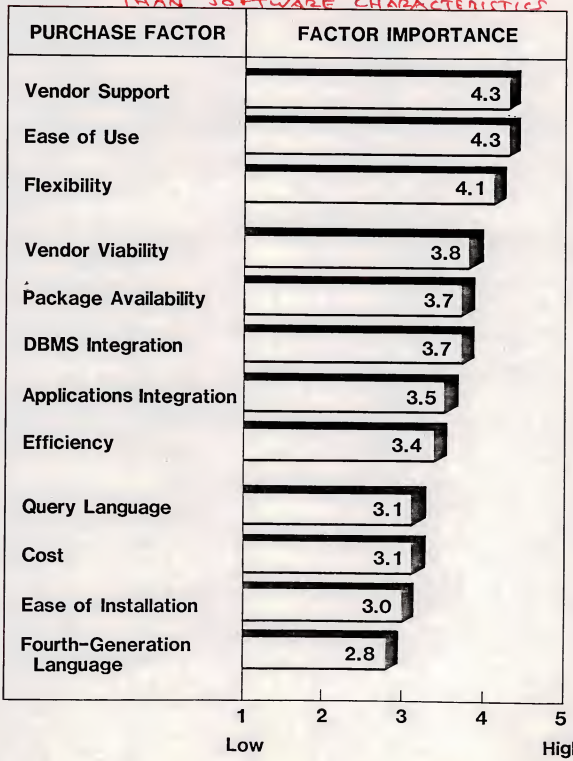

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EXHIBIT II-96

INTEGRATED SOFTWARE IMPLEMENTATION PLAN

Criteria

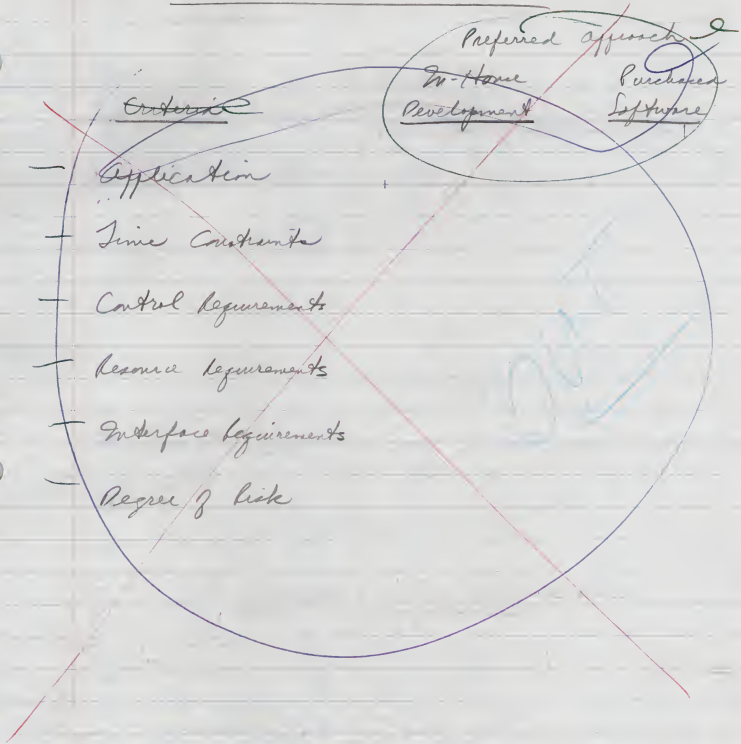

EXHIBIT II-9/6

IMPLEMENTATION PLAN

SELECTION CONSIDERATIONS

STET

ALTERNATIVE	CONTROL	RISK	TIME	COST
Internal Development	High	Low	Medium	High
Third Party Contract	Medium	~~High~~ Medium	Medium	Low
Joint Venture	Medium	Medium	Medium	Medium
Purchased Package	~~Low~~ Low	Medium	Low	Low

If used, make consistent w/ MSIN ? & II-7

Word processing/graphics: This exhibit is now II-6. Make changes in blue.

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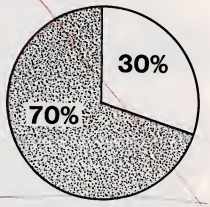
EXHIBIT II-8

MARKETPLACE IMPACT

NATURE OF THE MARKET

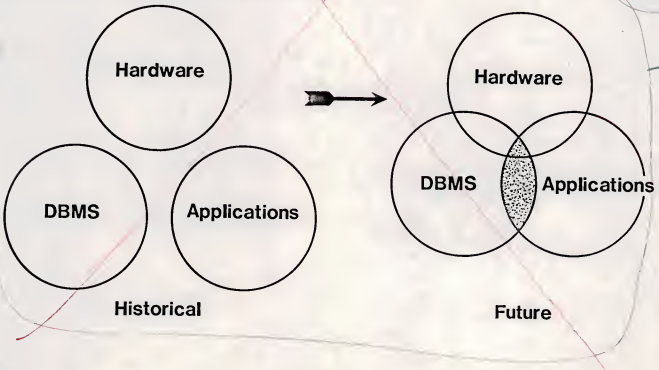


Data Processing

End Users

Decision Making Mix

VENDOR POSITION WITHIN MARKET



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IIA

Don't use $ projections

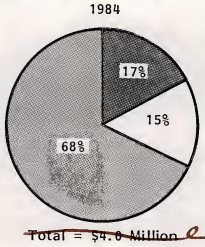
but % of appl or

something that MIS people

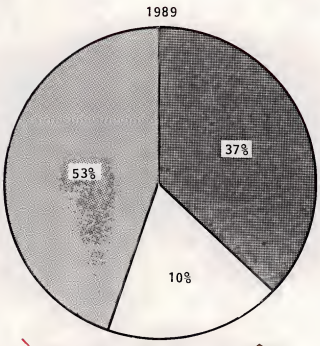
can relate to.

EXHIBIT III-1

SOFTWARE USAGE TRENDS



Total = $4.6 Million



Total = $20.3 Million

DBMS Software

Applications Software

Integrated Systems

Percent of User Expenditures

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EXHIBIT III-2

INDUSTRY/TECHNOLOGY TRENDS

- Increasing Capability of Mini/Micro/Personal Computers
- Greater Demand for Relational Data Structures
- Greater Use of Data Dictionaries
- Introduction of Fault-Tolerant Architecture
- Increased Use of Distributed Data Bases
- ~~"Office/Factory of the Future" Integration~~
- ~~Incorporation of Visual/Voice Communications~~
- ~~Increasing Demand for Applications Development by End Users~~
- Growing Emphasis on Vertical Market Systems
- Expansion from Single to Multiple Industry Systems
- Evolution from Integrated Interactive to Adaptable, Transportable System

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III - P3

Doesn't follow: Ind Eppl phys need more tailoring that X-ind phys →

III-2

EXHIBIT ~~IV-1~~

OVERALL USER SATISFACTION:
DBMS-based APPLICATIONS RUNNING ON DBMSs
(Purchased or Internally Developed)

Average Satisfaction Level = 3.7

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III-3

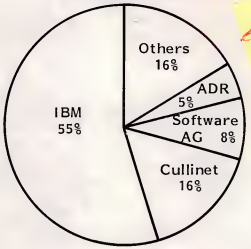
EXHIBIT ~~IV-2~~ e

PROFILE OF INSTALLED INTEGRATED APPLICATIONS

Type of Application

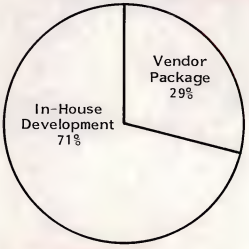
FREQUENCY OF OCCURENCE	APPLICATION
1	Customer Information Files/Systems
2	Manufacturing/Production
3	Marketing/Sales Management
4	Finance/Accounting

Vendor Software Share



Cincom ?
No data.
√ (from CI)

Installation Method Share



Specialists?

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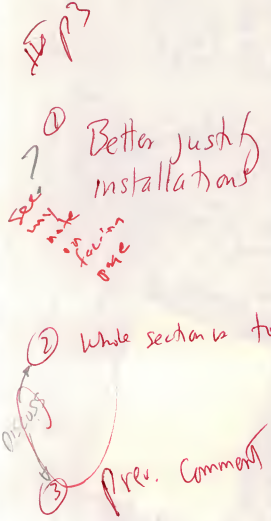
① Better justify than since Cincom has 4K installations
② Whole section is too vendory
Prev. Comment

EXHIBIT ~~IV-3~~ III-4e

SOFTWARE INTEGRATION PREFERENCES

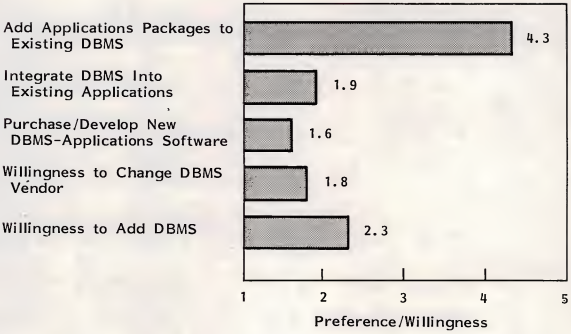

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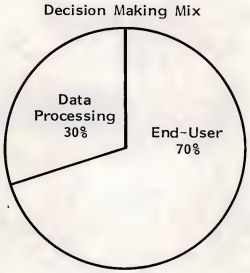
EXHIBIT IV-4

INTEGRATED SOFTWARE PURCHASE DECISION PROFILES



PURCHASE CRITERIA	END USER	DATA PROCESSING
Software Orientation	Application	DBMS
Hardware Orientation	Mini/Micro/Personal	Mainframe
Primary Focus	Business Problems	Technical Capability
Organizational Focus	Decentralized	Centralized
Budget Constraints	Variable	Fixed
Sales Cycle	Short	Long
Purchasing Role	Decision Maker	Advisor with Veto Power

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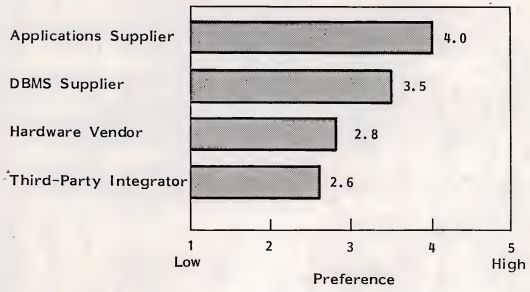
EXHIBIT IV-5

INTEGRATED SYSTEMS VENDOR PREFERENCE



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Again, pretty random

EXHIBIT ~~IV-6~~ III-6

IMPORTANCE OF FACTORS IN INTEGRATED SOFTWARE PURCHASES

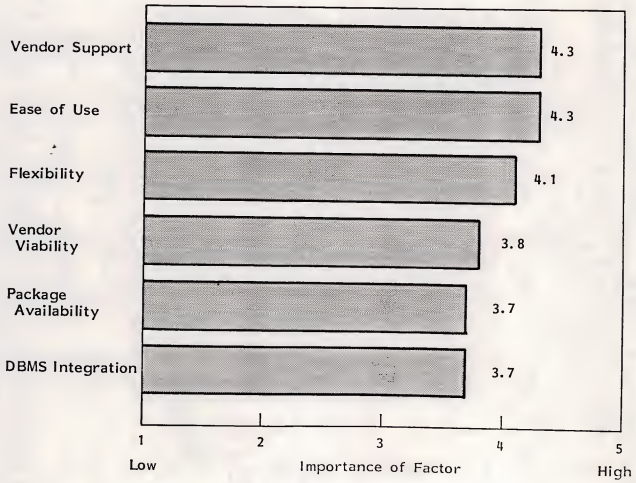

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EXHIBIT ~~IV-6~~ III-6 (Cont.)

IMPORTANCE OF FACTORS IN
INTEGRATED SOFTWARE PURCHASES

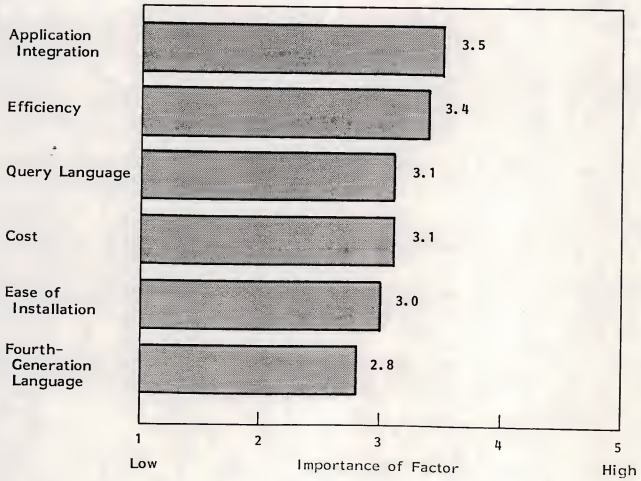

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EXHIBIT IV-7

COMPARISON: ALL RESPONDENTS VERSUS
RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES

CHARACTERISTICS	PREFERENCE (1 = Low, 5 = High)	
	ALL RESPONDENTS	RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES
Change/Add DBMS Willingness		
Willingness to Change DBMS Vendor	1.8	1.4
Willingness to Add DBMS	2.3	1.4
Integration Strategy		
Add Applications to Existing DBMS	4.3	4.9
Integrate DBMS into Existing Applications	1.9	1.7
Purchase/Develop New Software System	1.6	1.7
Software Vendor Preferences		
Applications Supplier	4.0	4.0
DBMS Supplier	3.5	3.5
Hardware Supplier	2.8	1.5
Third-Party Integrator	2.6	2.1
Software Purchase Considerations		
Vendor Support	4.3	4.8
Ease of Use	4.3	3.8
Flexibility	4.1	3.8
Vendor Viability	3.8	4.1
Package Availability	3.7	3.8
DBMS Integration	3.7	3.6
Application Integration	3.5	4.3
Efficiency	3.4	3.8
Query Language	3.1	3.4
Cost	3.1	2.4
Ease of Installation	3.0	3.3
Fourth-Generation Language	2.8	3.4

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EXHIBIT IV-1

VENDOR CLASSIFICATIONS (Examples)

HARDWARE	DBMS	APPLICATIONS
Mainframe	ADR	Logan
IBM	Cullinet	MSA
~~BUNCH~~	Cincom	McCormack & Dodge
Minicomputer	~~ADR~~	Walker
- DEC	Software AG	~~Hogan~~
- HP		
- DG		

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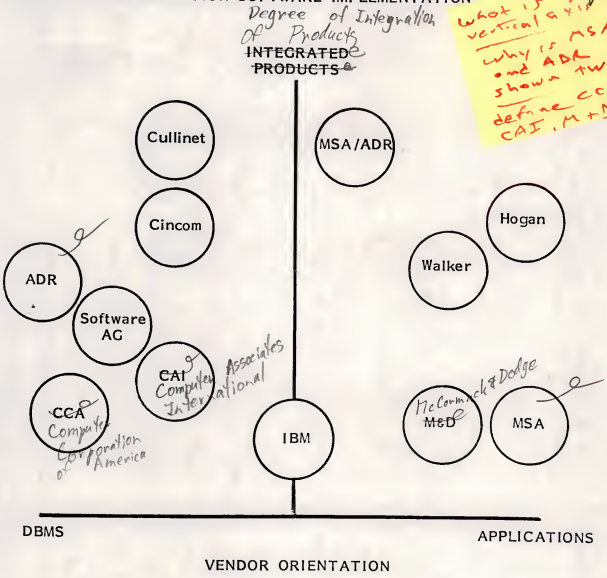
EXHIBIT ~~IV-2~~ EV-2

DEGREE OF INTEGRATED DBMS -
APPLICATION SOFTWARE IMPLEMENTATION



what is vertical axis?
why is MSA and ADR shown twice?
define CCA, CAI, M+D

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Don't use vertical formats like this - do it so reader doesn't have to turn book.

EXHIBIT ~~V-3~~ ID-3

LEADING DBMS VENDOR PROFILES

COMPANY CHARACTERISTICS	CULLINET	CINCOM	ADR	SOFTWARE AG	IBM
1984 Projected Revenues ($ Million)	$120	$100	$115	$40	$31,520
1983 – 1984 Annual Growth Rate (Percent)	50	35	30	30	16
DBMS CHARACTERISTICS					
Name	IDMS, IDMS/R	~~Total~~ TOTAL, TIS	DATACOM	ADABAS	IMS, DL/1, DB2
Type*	H,R	H,R	R	R	~~N,H,R~~ SQL
Fourth Generation Language	ADS/O	MANTIS	IDEAL	NATURAL	
Percent of Company Revenues ~~(Percent)~~	80%	50%	20%	-	1%
Customer Sites (U.S.)	1,800	2,000	500	1,300	[illegible]

what years?

U.S. or worldwide

* N = Network
H = Hierarchical
R = Relational

Tom's note earlier said 4K sites. which is it?

is vertical.

? implies: orient

50

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EXHIBIT VI-1

PURCHASED INTEGRATED SYSTEMS/
IN-HOUSE DEVELOPMENT COMPARISON

APPLICATION AREA	PREFERRED APPROACH	
	IN-HOUSE DEVELOPMENT	PURCHASED SOFTWARE
Manufacturing/Production		X——X
Marketing/Sales	X——X	
Finance/Accounting	X——————X	
Engineering/Technical		X——X

ISSUE	ADVANTAGE	
	IN-HOUSE DEVELOPMENT	PURCHASED SOFTWARE
Development Time		X
Degree of Control	X	
Staff Resource Involvement		X
End-User Involvement	Depends on Application	
Interfaces with Existing:		
- Hardware	X	
- Operating System	X	
- Applications	Depends on Application	
Technical Risk	Depends on Application	
Financial Risk	Depends on Application	

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V-2

EXHIBIT ~~VI-2~~

"PERFECT"

"~~IDEAL~~" INTEGRATED SOFTWARE VENDOR CHARACTERISTICS

1. Established Reputation (Company/Products/Services)
2. Established Customer Base
3. Sufficient Management/Technical Resources
4. Relational DBMS
5. Application Development Tools
6. Higher Level (Fourth-Generation) Language
7. Mini/Micro Computer Linkage
8. Interface with Other Vendors' DBMSs/Applications
9. Cross-Industry Applications
10. Vertical Market Applications
11. End-User Orientation

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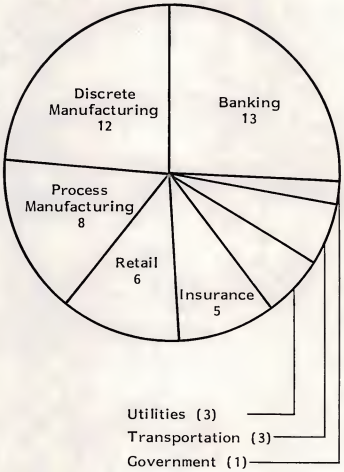
EXHIBIT B-1

DISTRIBUTION OF RESPONDENTS BY INDUSTRY



Total Respondents = 51

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APPENDIX C
USER QUESTIONNAIRE
INTEGRATED DBMS - APPLICATIONS SOFTWARE

INPUT is a market research firm specializing in the information services industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our vendor market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors - particularly Cullinet - are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data. This allows sharing of data between different applications programs without transferring data between application-dependent files.

1. Can you tell me what your reaction is to this development in a general way? Perhaps you have some positive or negative impressions about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations.

   _____

   _____

   What are the top three reasons why you would like to buy applications packages integrated with DBMSs?

   _____

   _____

2. Are you running any integrated DBMS-applications software already? (If Yes, continue. If No, proceed to Question 3 .)

   a. What are the applications? _____

   b. Did you develop them internally or purchase them? (If purchased, find name of package and vendor.) How much did it cost?

      _____

      _____

2. (Cont.)

c. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications which use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

Was the application designed to run on a DBMS or modified by users to run on a DBMS?

_____

_____

d. What alternative vendors or methods of acquiring the software did you investigate, and why did you choose the source you used?

_____

_____

e. Why did you integrate these applications and not others? What made them lend themselves to integration?

_____

_____

_____

f. How would you rate your satisfaction with this software overall (1-5)? Why? What problems have you had with it?

_____

_____

_____

_____

3. What are your three most important applications? (By resource use or criticality to the company or purchase price.)

_____

_____

Are there any other integrated DBMS-applications software systems you are planning to acquire? What? When? Why?

_____

_____

_____

4. In choosing an integrated DBMS-applications system, how would you rate the following factors? (1-5)

a. ☐ Packages available
b. ☐ Cost considerations
c. ☐ Vendor support
d. ☐ Vendor viability
e. ☐ Integration with other applications
f. ☐ Integration with existing DBMS
g. ☐ Flexibility
h. ☐ Ease of use
i. ☐ Efficiency
j. ☐ Ease of installation
k. ☐ Query language
l. ☐ Fourth generation language
m. ☐ High-order language interface
n. ☐ Other (please specify) _____

5. What is the likelihood you would change DBMS vendors if one offered a good integrated DBMS-applications software system, rated from one to five?

_____

6. What is the likelihood you would buy an integrated system requiring you to maintain a DBMS in addition to your existing one, rated from one to five?

_____

7. What is the process your company goes through in acquiring applications software packages? I.E.,

What process is used to identify software needs? _____

_____

Who does it? _____

_____

Who makes the recommendation to acquire particular software packages?

_____

_____

Who makes the final decision? _____

_____

How long does the process take? _____

_____

How would the process be different in acquiring applications packages integrated with an IDMS?

_____

_____

8. Which system would you be most likely to acquire, rated from 1-5.

a. ☐ An integrable applications package to attach to your existing DBMS.

b. ☐ A DBMS that can be tied into your existing applications packages.

c. ☐ An integrated DBMS-applications software system unrelated to your current systems

9. Please rate from 1-5 the vendors you would most likely buy integrated applications-DBMS packages from: Why?

   a. _____ A hardware supplier

   b. _____ An applications supplier

   c. _____ A DBMS supplier

   d. _____ A third-party integrator

   _____

   _____

   _____

10. What percent of your 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

    1984 _____%

    1987 _____%

    What percent would be of applications designed to use DBMSs if appropriate packages were available?

    1984 _____%

    1987 _____%

11. What percent of your 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

    1984 _____%

    1987 _____%

12. Do you know of any other departments or organizations now using integrated DBMS-applications software systems or planning to acquire them?

Company _____ Company _____

Person _____ Person _____

Title _____ Title _____

Phone # (____)_____ Phone # (____)_____

Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

_____

_____

_____

_____

Confirm company, name, address for report summary forwarding.

Thank you for your time.

APPENDIX D
VENDOR QUESTIONNAIRE
INTEGRATED DBMS - APPLICATIONS SOFTWARE

INPUT is a market research firm specializing in the information services industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our ~~vendor~~ market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors - ~~particularly Cullinet~~ - are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data.

1. Can you tell me what your reaction is to this development in a general way? What is your experience (or impressions) about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations?

   _____

   _____

   _____

2. What are the top three reasons why your customers would like to buy applications packages integrated with DBMS?

   _____

   _____

   What are the technical considerations which are encouraging - and holding back - DBMS/application integration?

   _____

   _____

3. Which applications areas do you believe offer the most opportunities in this area? Why?

_____

_____

4. Do you offer any integrated applications-DBMS packages already - or do you have plans to offer any? What are they?

_____

_____

a. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications which use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

5. In choosing an integrated DBMS-applications systems, how would you think your customers rate the following factors? (1-5)

   a. Packages available
   b. Cost considerations
   c. Vendor support
   d. Vendor viability
   e. Integration with other applications
   f. Integration with existing DBMS
   g. Flexibility
   h. Ease of use
   i. Efficiency
   j. Ease of installation
   k. Query language
   l. Fourth generation language
   m. High-order language interface
   n. Other (please specify)

6. How likely are customers to change DBMS vendors because of a particularly good integrated DBMS-applications software system, rated (1-5)?

   _____

   _____

7. How likely are customers to buy an integrated system requiring them to maintain a DBMS in addition to their existing one, rated from (1-5)?

   _____

   _____

8. What percent of DBMS sales do you expect will be tied to sales of integrated DBMS-applications systems in the next three years? Why?

   _____

   _____

   _____

9. What percent of sales do you expect from the following product approaches in the next three years?

_____% DBMS and existing (modified) packages

_____% DBMS and newly-constructed packages

10. Which system do you think users are most likely to acquire, rated (1-5)?

a. An integrable applications package to attach to their existing DBMS.

b. A DBMS that can be tied into their existing applications packages.

c. An integrated DBMS-applications software system unrelated to their current systems

11. What percent of the market do you expect the following types of vendors will have (for applications designed to run on DBMSs) in 1987?

a. A hardware supplier? _____%

b. An applications supplier? _____%

c. A DBMS supplier? _____%

d. A third-party integrator _____%

12. What percent of 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

a. 1984 _____%

b. 1987 _____%

13. What percent of 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

a. 1984 _____%

b. 1987 _____%

14. What, if any, premium do you expect customers to pay for integrated applications compared to software applications?

15. What other vendors do you see becoming active in offering integrated DBMS/applications packages?

16. Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

Confirm company, name, address for report summary forwarding.

Thank you for your time.

EXHIBIT II-1

INTEGRATED DBMS-APPLICATIONS SOFTWARE STRATEGIES

- INPUT MAPS Report
- Three Types of Software
  - Data Base Management (DBMS)
  - Applications
  - Integrated
- Integrated Software a Major Opportunity
  - Explore Sales Growth Expected
  - Aggressive Integration Strategy Needed
  - High-Quality Integration Necessary
  - Significant Commitment Figured
- Research Scope
  - Projected Market Growth
  - User Needs and Attitudes
  - Vendor Responses
  - Integrated Software Strategy Methodology

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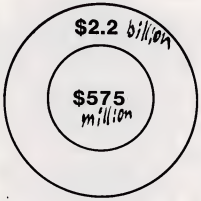
EXHIBIT II-2

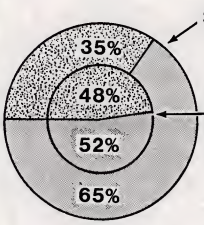
MARKET PROJECTIONS : 1984–1989

IBM and PCM Mainframe Software

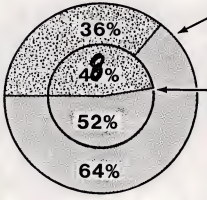
DBMS ~~Integrated~~ Software Expenditures



Applications Software (Integrated and Non-Integrated) Expenditure



Integrated DBMS - Applications Software



1989 ($ Billion)
1984 ($ Million)
Cross-Industry
Industry-Specific

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EXHIBIT II-3

INTEGRATED APPLICATIONS CHARACTERISTICS

- 90% Report Installed Integrated Applications
- 70% Indicate Above-Average Satisfaction
- 50% Cross-Industry/50% Vertical Market
- Most Common Applications:
  - Customer Information Files/Systems
  - Manufacturing/Production
  - Marketing/Sales
  - Finance/Accounting

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EXHIBIT II-4

INTEGRATED APPLICATIONS DEVELOPMENT APPROACH

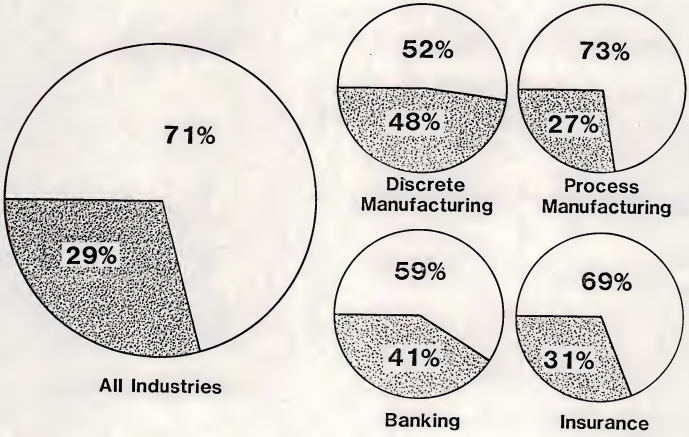

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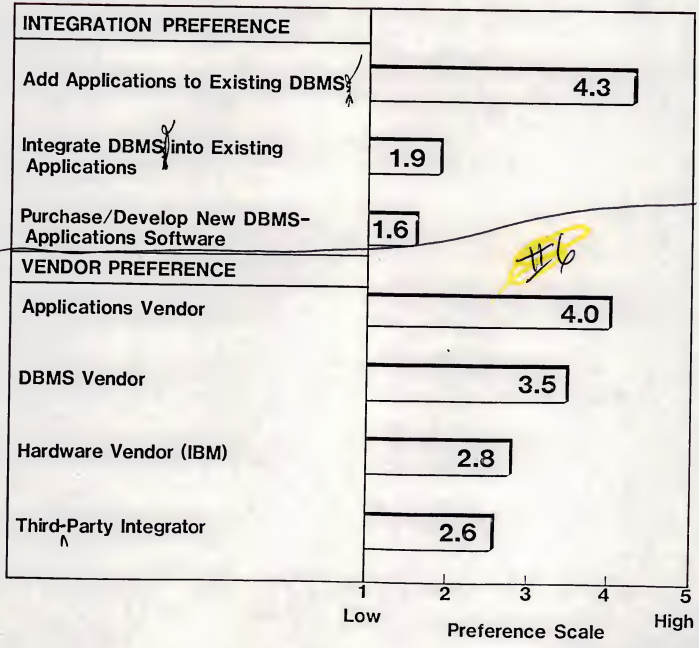
EXHIBIT II-5

INTEGRATED APPLICATIONS DEVELOPMENT APPROACH

STET

DBMS-APPLICATIONS SOFTWARE INTEGRATION PREFERENCES

same as MSIN chart



#6

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INPUT
MSIN

EXHIBIT II-6

INTEGRATED SOFTWARE PURCHASE PRIORITIES

11-7

12 pt.

CHORUS	FACTOR	
I	VENDOR SUPPORT	4.3
(OVER 4.0)	EASE of USE	4.3
	FLEXIBILITY	4.1
II	VENDOR VIABILITY	3.8
3.4-4.0	PACKAGE AVAILABILITY	3.7
II	DBMS INTEGRATION	3.7
	APPLICATIONS INTEGRATION	3.5
	EFFICIENCY	3.4
III	QUERY LANGUAGE	3.1
2.7 AND	COST	3.1
	EASE of INSTALLATION	3.0
	FOURTH GENERATION LANGUAGE	2.8

1 LOW 2 3 4 5 HIGH

FACTOR IMPORTANCE

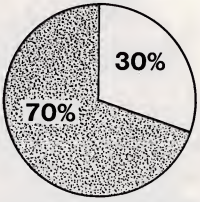
Factor Numbers Needed and the importance of the 3 different shadings

Note to graphics: do not use seperate shadings.

EXHIBIT ~~II-7~~ II-8

MARKET PLACE IMPACTS

NATURE OF THE MARKET



Decision Making Mix

- Different Purchasing Criteria
- "One-Stop-Shopping" Not Essential

Data Processing

End Users

VENDOR POSITION WITHIN MARKET

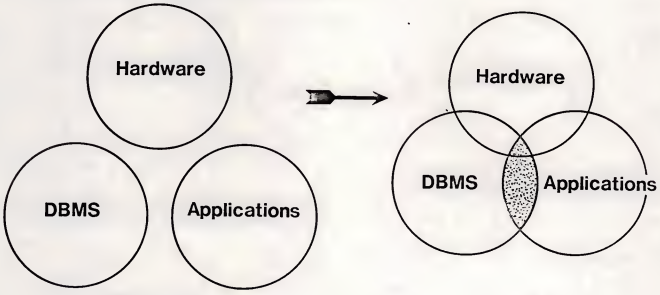


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EXHIBIT II-8 II-9

IMPLEMENTATION PLAN

ALTERNATIVE	CONTROL	RISK	TIME	COST
Internal Development	High	Low	Medium	High
Third Party Contract	Medium	High	Medium	Low
Joint Venture	Medium	Medium	Medium	Medium
Customer Development	Low	Low-High	Low-High	Low

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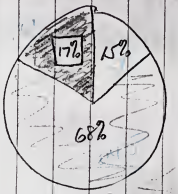
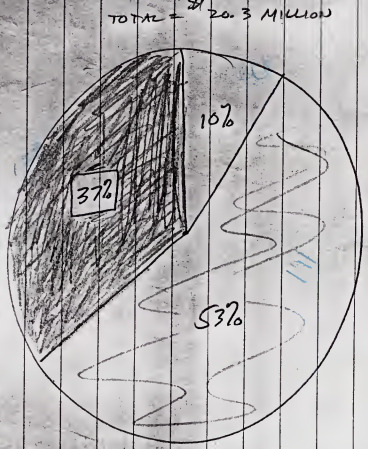
EXHIBIT III-1

SOFTWARE USAGE TRENDS



1984



1989

- DBMS SOFTWARE
- APPLICATIONS SOFTWARE
- INTEGRATED SYSTEMS

EXHIBIT III-2

INDUSTRY/TECHNOLOGY TRENDS

Increasing Capability of Mini/Micro/Personal Computers

Greater Demand for Relational Data Structures

Greater Use of Data Dictionaries

Introduction of Fault-Tolerant Architectures

Increased Use of Distributed Data Bases

"Office/Factory-of-The-Future" Integration

Incorporation of Visual/Voice Communications

Increasing Demand for Application Development by End Users

Growing Emphasis on Vertical Market Systems

Expansion from Single to Multiple Industry Systems

Evolution from Integrated Structure to Adaptable, Transportable System

EXHIBIT IV-1

OVERALL USER SATISFACTION:
APPLICATIONS RUNNING ON DBMSs
(Purchased or Internally Developed)

Average Satisfaction Level = 3.7

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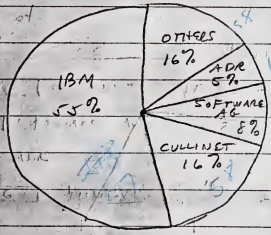
EXHIBIT IV-2

PROFILE OF INSTALLED INTEGRATED APPLICATIONS

FREQUENCY OF OCCURRENCE	TYPE OF APPLICATION
	APPLICATION
1	CUSTOMER INFORMATION FILES/SYSTEMS
2	MANUFACTURING/PRODUCTION
3	MARKETING/SALES MANAGEMENT
4	FINANCE/ACCOUNTING

VENDOR SOFTWARE



INSTALLATION METHOD

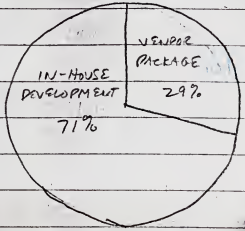


EXHIBIT IV-3

SOFTWARE INTEGRATION PREFERENCES

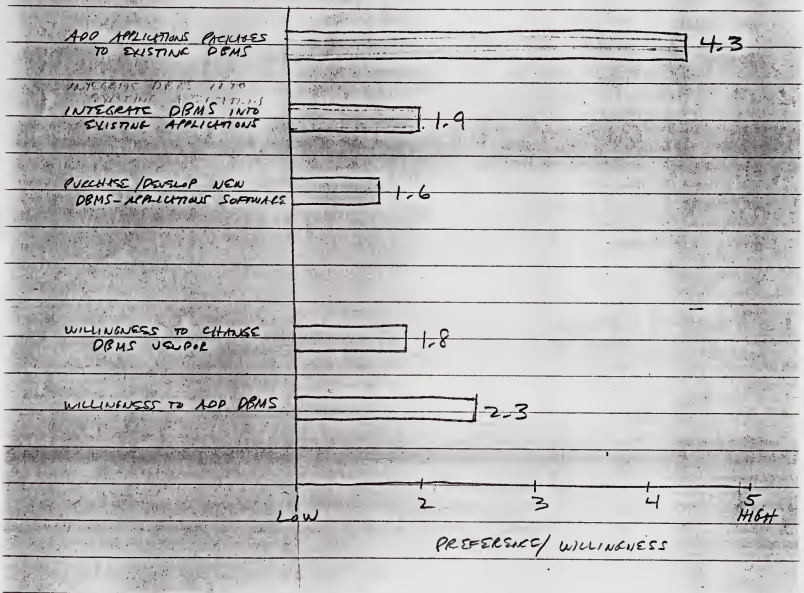
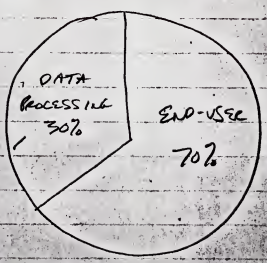


EXHIBIT IV-4

INTEGRATED SOFTWARE: PURCHASE DECISION PROFILES



DECISION MAKING MIX

PURCHASE CRITERIA	END USER	DATA PROCESSING
Software Orientation	Application	DBMS
Hardware Orientation	Mini/Micro/Personal	Mainframe
Primary Focus	Business Problems	Technical Capability
Organizational Focus	Decentralized	Centralized
Budget Constraints	Variable	Fixed
Sales Cycle	Short	Long
Purchasing Role	Decision Maker	Advisor with Veto Power

EXHIBIT IV - 5

INTEGRATED SYSTEMS VENDOR PREFERENCE

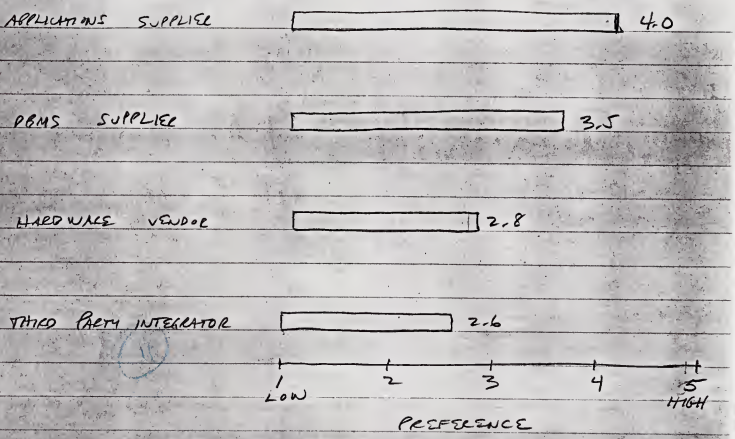


EXHIBIT IV-16

IMPORTANCE OF FACTORS IN
~~APPLICATIONS~~ INTEGRATED SOFTWARE PURCHASES
~~(User Viewpoint)~~
~~All Industries~~

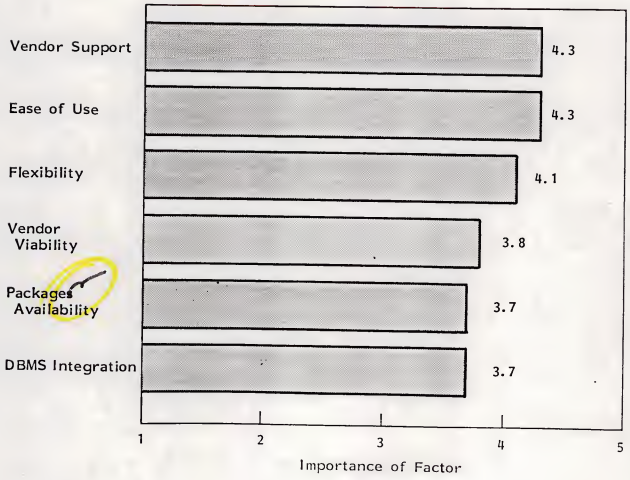


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EXHIBIT IV-6 (Cont.)

IMPORTANCE OF FACTORS IN INTEGRATED APPLICATIONS SOFTWARE PURCHASES

~~(User Viewpoint)~~

All Industries

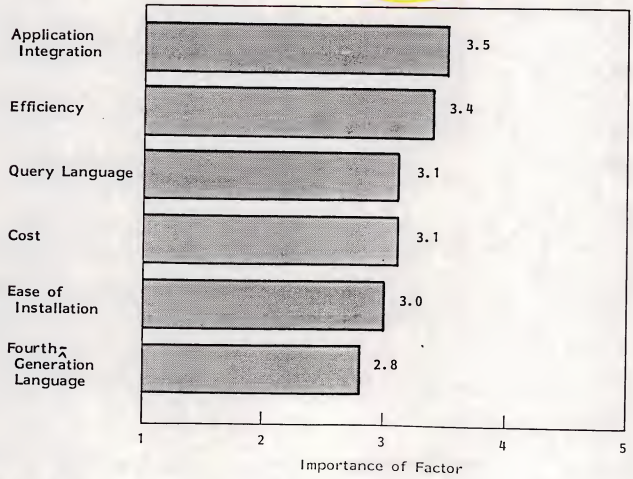

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EXHIBIT IV-12

COMPARISON: ALL RESPONDENTS AND VRS.
RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES

CHARACTERISTICS	PREFERENCE (1 = Low, 5 = High)	
	ALL RESPONDENTS	RESPONDENTS WITH PURCHASED INTEGRATED PACKAGES
Change/Add DBMS Willingness		
Willingness to Change DBMS Vendor	1.8	1.4
Willingness to Add DBMS	2.3	1.4
Integration Strategy		
Add Applications to Existing DBMS	4.3	4.9
Integrate DBMS into Existing Applications	1.9	1.7
Purchase/Develop New Software System	1.6	1.7
Software Vendor Preferences		
Applications Supplier	4.0	4.0
DBMS Supplier	3.5	3.5
Hardware Supplier	2.3	1.5
Third-Party Integrator	2.6	2.1
Software Purchase Considerations		
Vendor Support	4.3	4.8
Ease of Use	4.3	3.8
Flexibility	4.1	3.8
Vendor Viability	3.8	4.1
Package Availability	3.7	3.8
DBMS Integration	3.7	3.6
Application Integration	3.5	4.3
Efficiency	3.4	3.8
Query Language	3.1	3.4
Cost	3.1	2.4
Ease of Installation	3.0	3.3
Fourth-Generation Language	2.8	3.4

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EXHIBIT V-11

VENDOR CLASSIFICATIONS

HARDWARE	DBMS	APPLICATIONS
IBM	Cullinet	MSA
Bunch	Cincom	McCormack & Dodge
Minicomputer	ADR	WALKER
- DEC	Software AG	HOGAN
- DG		
- HP		

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EXHIBIT V-2

DEGREE OF INTEGRATED DBMS -
APPLICATIONS SOFTWARE IMPLEMENTATION

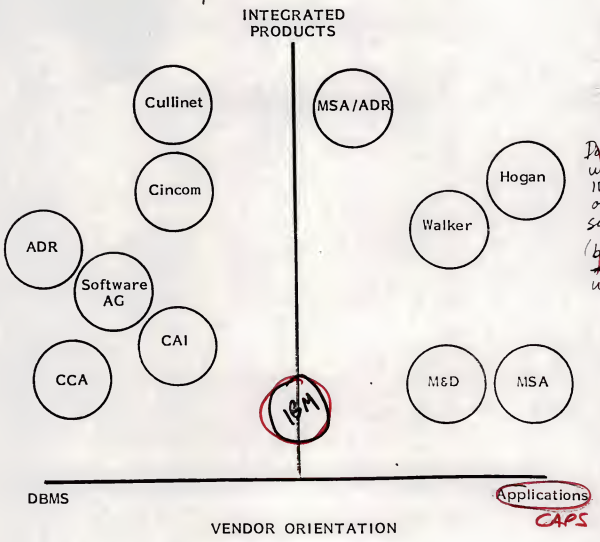

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EXHIBIT V-~~7~~ 3

LEADING DBMS VENDOR PROFILES

COMPANY CHARACTERISTICS	IBM	CULLINET	CINCOM	ADR	SOFTWARE AG
1984 Projected Revenues ($ Million)	-	$120	$100	$115	$40
Annual Growth Rate (Percent)	-	50	35	30	30
DBMS CHARACTERISTICS					
Name	IMS, DL/I, DB2	IDMS, IDMS/R	Total, TIS	DATACOM	ADABAS
Type*	N,H,R	H,R	H,R	R	R
Fourth-Generation Language	SQL	ADS/O	MANTIS	IDEAL	NATURAL
Percent of Company Revenues (Percent)	-	80%	50%	20%	-
Customer Sites	-	1,800	2,000	500	1,300

* N: [illegible]
H: [illegible]
R: [illegible]

DELETE IBM

Why no values for IBM (add note?)

83

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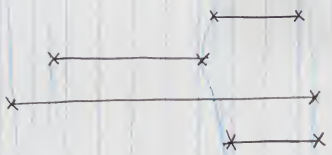
EXHIBIT VI-1

PURCHASED INTEGRATED SYSTEMS / IN-HOUSE DEVELOPMENT COMPARISON

APPLICATION AREA	PREFERRED APPROACH: IN-HOUSE DEVELOPMENT	PREFERRED APPROACH: PURCHASED SOFTWARE
Manufacturing / Production		
Marketing / Sales		
Finance / Accounting		
Engineering / Technical		



ISSUE	ADVANTAGE: IN-HOUSE DEVELOPMENT	ADVANTAGE: PURCHASED SOFTWARE
Development Time		X
Degree of Control	X	
Staff Resource Involvement		X
End-user Involvement	DEPENDS ON APPLICATION	
Interface with Existing:		
– Hardware	X	
– Operating System	X	
– Applications	DEPENDS ON APPLICATION	
Technical Risk	DEPENDS ON APPLICATION	
Financial Risk	DEPENDS ON APPLICATION	

EXHIBIT VI-2

"IDEAL" INTEGRATED SOFTWARE VENDOR CHARACTERISTICS

1. Established Reputation (Company/Products/Services)
2. Established Customer Base
3. Sufficient Management/Technical Resources
4. Relational DBMS
5. Application Development Tools
6. Higher Level (Fourth-Generation) Language
7. Mini/Micro Computer Linkage
8. Interface with Other Vendors' DBMS/Applications
9. Cross-Industry Applications
10. Vertical Market Applications
11. End-User Orientation

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EXHIBIT VI-3.

INTEGRATED SOFTWARE VENDOR/PRODUCT EVALUATION FORM

CHARACTERISTIC	RATING *	PRIORITY *	WEIGHTED RATING **	COMMENTS
COMPANY TRACK RECORD				
INSTALLED CUSTOMER BASE				
FUTURE SUPPORT POTENTIAL				
COMPATIBILITY:				
- HARDWARE				
- DBMS				
- APPLICATIONS				
DISTRIBUTED PROCESSING CAPABILITY				
MINI/MICRO/PC INTERFACES				
SUPPORT ORIENTATION:				
- END USERS				
- DATA PROCESSING				
SUPPLIER/PRODUCT ORIENTATION				
SALES & MAINTENANCE APPROACH				
PRICING POLICY				
		TOTAL:		

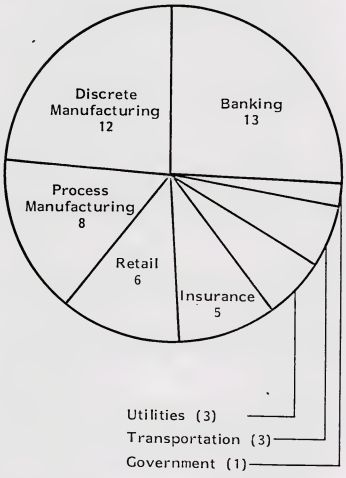
* SCALE:
1: LOW
2: MEDIUM
3: HIGH

** (RATING) X (PRIORITY)

WEIGHTED RATING =

EXHIBIT B-1

DISTRIBUTION OF RESPONDENTS BY INDUSTRY



Total Respondents = 51

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U-SIN Same title Appendix C+D

CATALOG NO. MSIIN

APPENDIX C

INTEGRATED DBMS - APPLICATIONS SOFTWARE

USER QUESTIONNAIRE

"User Questionna

INPUT is a market research firm specializing in the information servi industry. The reason I've called you is that we'd like to find out w your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our vendor market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors - particularly Cullinet, are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data. This allows sharing of data between different applications programs without transferring data between application-dependent files.

1. Can you tell me what your reaction is to this development in a general way? Perhaps you have some positive or negative impressions about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations.

   _____

   _____

   What are the top three reasons why you would like to buy applications packages integrated with DBMSs?

   _____

   _____

2. Are you running any integrated DBMS-applications software already? (If Yes, continue. If No, proceed to Question .)

   a. What are the applications? _____

   b. Did you develop them internally or purchase them? (If purchased, find name of package and vendor.) How much did it cost?

      _____

      _____

120

2. (Cont.)

c. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications which use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

Was the application designed to run on a DBMS or modified by users to run on a DBMS?

_____

_____

d. What alternative vendors or methods of acquiring the software did you investigate, and why did you choose the source you used?

_____

_____

e. Why did you integrate these applications and not other? What made them lend themselves to integration?

_____

_____

_____

f. How would you rate your satisfaction with this software overall (1-5)? Why? What problems have you had with it?

_____

_____

_____

_____

3. What are your three most important applications? (By resource use or criticality to the company or purchase price.)

_____

_____

Are there any other integrated DBMS-applications software systems you are planning to acquire? What? When? Why?

_____

_____

_____

4. In choosing an integrated DBMS-applications systems, how would you rate the following factors? (1-5)

a. ☐ Packages available
b. ☐ Cost considerations
c. ☐ Vendor support
d. ☐ Vendor viability
e. ☐ Integration with other applications
f. ☐ Integration with existing DBMS
g. ☐ Flexibility
h. ☐ Ease of use
i. ☐ Efficiency
j. ☐ Ease of installation
k. ☐ Query language
l. ☐ Fourth generation language
m. ☐ High-order language interface
n. ☐ Other (please specify) _____

5. What is the likelihood you would change DBMS vendors if one offered a good integrated DBMS-applications software system, rated from one to five?

_____

6. What is the likelihood you would buy an integrated system requiring you to maintain a DBMS in addition to your existing one, rated from one to five?

_____

7. What is the process your company goes through in acquiring applications software packages? I.E.,

What process is used to identify software needs? _____

_____

Who does it? _____

_____

Who makes the recommendation to acquire particular software packages?

_____

_____

Who makes the final decision? _____

_____

How long does the process take? _____

_____

How would the process be different in acquiring applications packages integrated with an IDMS?

_____

_____

8. Which system would you be most likely to acquire, rated from 1-5.

a. ☐ An integratible applications package to attach to your existing DBMS.

b. ☐ A DBMS that can be tied into your existing applications packages.

c. ☐ An integrated DBMS-applications software system unrelated to your current systems

9. Please rate from 1-5 the vendors you would most likely buy integrated applications-DBMS packages from: Why? (See questions #).

   a. _____ A hardware supplier

   b. _____ An applications supplier

   c. _____ A DBMS supplier

   d. _____ A third-party integrator

   _____

   _____

   _____

10. What percent of your 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

    1984 _____%

    1987 _____%

    What percent would be of applications designed to use DBMSs if appropriate packages were available?

    1984 _____%

    1987 _____%

11. What percent of your 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

    1984 _____%

    1987 _____%

12. Do you know of any other departments or organizations now using integrated DBMS-applications software systems or planning to acquire them?

Company _____ Company _____

Person _____ Person _____

Title _____ Title _____

Phone # (____)_____ Phone # (____)_____

Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

_____

_____

_____

_____

Confirm company, name, address for report summary forwarding.

Thank you for your time.

APPENDIX D

INTEGRATED DBMS - APPLICATIONS SOFTWARE

VENDOR QUESTIONNAIRE

INPUT is a market research firm specializing in the information services industry. The reason I've called you is that we'd like to find out what your views are on integrated DBMS-applications software. I'm preparing a report on this topic for our vendor market research program.

If you agree to participate in this survey - it should take about 20 to 30 minutes - I'll send you a summary of the report. Other people I've talked to have found answering the questions I'm asking helpful in defining what their own needs are and in finding out what other MIS departments are planning. Would you like to participate?

As I'm sure you realize, several DBMS vendors - particularly Cullinet - are beginning to sell packaged applications that use the vendors' DBMS instead of traditional files to store data.

1. Can you tell me what your reaction is to this development in a general way? What is your experience (or impressions) about cost, conversion, efficiency, flexibility, user interface, maintenance, or other considerations?

   _____

   _____

   _____

2. What are the top three reasons why your customers would like to buy applications packages integrated with DBMS?

   _____

   _____

   What are the technical considerations which are encouraging - and holding back - DBMS/application integration?

   _____

   _____

3. Which applications areas do you believe offer the most opportunities in this area? Why?

4. Do you offer any integrated applications-DBMS packages already - or do you have plans to offer any? What are they?

a. Please tell me which of the following statements concerning the extent of your DBMS integration you agree with.

1. The data in the DBMS is independent of the applications which use it.
2. The DBMS is embedded in the application. It is just a new file system; data is dependent on the application.
3. The DBMS is embedded in the application, but the application itself is integrated with other applications. That is to say, data cannot be accessed directly from the DBMS; it must be accessed through the application.
4. The application uses partly a DBMS and partly a traditional file system.

5. In choosing an integrated DBMS-applications systems, how would you think your customers reate the following factors? (1-5)

   a. Packages available
   b. Cost considerations
   c. Vendor support
   d. Vendor viability
   e. Integration with other applications
   f. Integration with existing DBMS
   g. Flexibility
   h. Ease of use
   i. Efficiency
   j. Ease of installation
   k. Query language
   l. Fourth generation language
   m. High-order language interface
   n. Other (please specify)

6. How likely are customers to change DBMS vendors because of a particularly good integrated DBMS-applications software system, rated (1-5)

   _____

   _____

7. How likely are customers to buy an integrated system requiring them to maintain a DBMS in addition to their existing one, rated from (1-5)

   _____

   _____

8. What percent of DBMS sales do you expect will be tied to sales of integrated DBMS-applications systems in the next three years? Why?

   _____

   _____

   _____

9. What percent of sales do you expect from the following product approaches in the next three years?

   _____% DBMS and existing (modified) packages

   _____% DBMS and newly-constructed packages

10. Which system do you think users are most likely to acquire, rated (1-5)

    a. An integratible applications package to attach to their existing DBMS.

    b. A DBMS that can be tied into their existing applications packages.

    c. An integrated DBMS-applications software system unrelated to their current systems

11. What percent of the market do you expect the following types of vendors will have (for applications designed to run on DBMSs) in 1987?

    a. A hardware supplier? _____%

    b. An applications supplier? _____%

    c. A DBMS supplier? _____%

    d. A third-party integrator _____%

12. What percent of 1984 applications software purchases do you expect will be of applications designed to use DBMSs?

    a. 1984 _____%

    b. 1987 _____%

13. What percent of 1984 applications software purchases do you expect will be designed to use DBMSs and PCs?

    a. 1984 _____%

    b. 1987 _____%

14. What, if any, premium do you expect customers to pay for integrated applications compared to software applications?

15. What other vendors do you seel becoming active in offering integrated DBMS/applications packages?

16. Are there any comments you would like to make concerning your experience or ideas on integrated DBMS-applications software systems we haven't discussed?

Confirm company, name, address for report summary forwarding.

Thank you for your time.